

Waukesha Bypass Noise Study

Prepared for
Waukesha Department of Public Works

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Submitted by



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1. Introduction

1.1 Purpose of the Analysis

Waukesha County, City of Waukesha, Town of Waukesha and the Wisconsin Department of Transportation (WisDOT) are evaluating alternatives and assessing the impacts of various alternatives to implement the long-planned West Waukesha Bypass.

The purpose of the traffic noise analysis was to assess potential noise impacts by evaluating worst case hourly traffic noise levels at noise sensitive locations and qualitatively evaluating noise abatement options in the project area.

1.1.1 Proposed Improvements

A wide range of alternatives were evaluated. Those that were retained for additional study are the subject of this noise analysis. The limits of the study are Rolling Ridge Drive on the north (just south of I-94) and the intersection of County X and WIS 59 on the south. One build alternative remains under consideration from the north terminus to Sunset Drive, and that is a 4-lane roadway largely on the existing County TT alignment. South of Sunset Drive four alternatives were subject to this noise analysis (Sunset-to-County X, Pebble Creek, Golf Course East and Golf Course East, Shift West). Both Golf Course East Alternatives have been dropped from consideration.

This report describes applicable noise criteria, the evaluation methodology used, and the analytical results. Based on the findings of the study, noise levels at noise-sensitive locations under the build condition exceed the applicable state and federal noise criteria. This necessitates consideration of feasible and reasonable noise mitigation measures, as discussed in the final section of this report.

Unless otherwise stated, all sound levels reported are energy equivalent levels (Leq), A-weighted, and measured in terms of decibels (dBA).

1.2 Criteria for Acceptable Noise Exposure

1.2.1 Regulatory Criteria

The criteria used to evaluate noise impacts are contained in Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, and the WisDOT *Facilities Development Manual, Chapter 23: Noise*. The Activity Category B and C noise level criteria (NLC) of 67 dBA apply to residences, churches, schools, recreation areas, and similar activities. Other developed land (e.g., hotels/motels or other business areas) is included in Activity Category E, with a NLC of 72 dBA. The NLC are noise impact thresholds for determining when consideration of noise abatement measures could be warranted. Noise levels are determined under worst case traffic noise conditions. Primary consideration is given to exterior areas where frequent human use occurs.

Table 1 shows the FHWA Design Level/ Activity Relationship used for determining the NLC for specific land uses (e.g., residential, commercial). WisDOT's Traffic Noise Evaluation form (Factor Sheet D-3) considers traffic noise impacts to occur if predicted peak-hour traffic noise levels approach or exceed the NLC. WisDOT defines "approach" as noise

levels within 1 dBA (66 dBA for Category B and C or 71 dBA for Category E) of the FHWA NLC in Table 1.

TABLE 1
Noise level criteria (NLC) for considering barriers

Land Use Category	$L_{eq}(h)^a$ (dBA) (Evaluation Location)		Description of Land Use Category
A	57 (Exterior)		Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B ^b	67 (Exterior)		Residential.
C ^b	67 (Exterior)		Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D ^c	52 (Interior)		Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E ^b	72 (Exterior)		Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	---	---	Undeveloped lands that are not permitted.

^a L_{eq} = Equivalent steady-state sound level, which in a stated period of time contains the same acoustical energy as the time-varying sound level during the same period. For purposes of measuring or predicting noise levels, a receptor is assumed to be at ear height, located five feet above ground surface.

$L_{eq}(h)$ =hourly value of L_{eq}

^b Includes undeveloped lands permitted for this activity category or publicly-owned recreation lands formally designated in a public agency's Master Plan.

^c Use of interior noise levels shall be limited to situations where a determination has been made that exterior abatement measures will not be feasible and reasonable and after exhausting all outdoor mitigation options.

1.2.2 Criteria for Increases in Noise Levels

In addition to the criterion sound levels described above, FHWA and WisDOT consider a traffic noise impact to occur if predicted sound levels substantially increase compared to existing noise levels. While FHWA guidance does not specifically define what constitutes a substantial increase, FHWA provides state highway agencies the flexibility in establishing their own definition of what constitutes a *substantial* increase. The Wisconsin DOT policy states that a predicted traffic noise level of 15 dBA or more over existing noise levels constitutes a *substantial* increase in noise levels for new highway projects.

2. Methodology

The analysis evaluated the current noise environment (based on 2010 traffic data) and four alternatives, the Pebble Creek Alternative, the Sunset-to-County X Alternative and the two Golf Course East Alternatives (based on forecast peak-hour traffic for 2035). Traffic noise levels were evaluated using the FHWA Traffic Noise Model version 2.5 (TNM 2.5) computer program. TNM 2.5 is the latest analytical method developed for highway traffic noise prediction. The model is based upon reference energy emission levels for automobiles, medium trucks (two axles), and heavy trucks (three or more axles) with consideration given to vehicle volume, speed, roadway configuration, distance to the receptor, terrain features, atmospheric conditions, and the acoustical characteristics of the site. TNM 2.5 was developed to predict hourly Leq values for free-flowing and interrupted-flow traffic conditions, and is generally considered to be accurate within ± 3 decibels. The model enables the user to account for the effects of different pavement types, graded roadways, terrain variations, and attenuation over/through rows of buildings and dense vegetation. The model uses traffic noise emission curves to accurately calculate noise levels generated by highway traffic.

Current tools in the TNM 2.5 model do not offer analysis capabilities for the effects of other factors, such as wind and atmospheric inversions. Therefore, a no-wind condition is assumed for this noise analyses. The model was validated by comparing noise measurements made in the study area with noise levels for existing conditions estimated by the model. All traffic data used for this analysis were obtained from GRAEF (under contract to CH2M HILL for this project). Noise impacts exceeding federal and state criteria from peak-hour traffic conditions were assessed at representative noise sensitive locations throughout the project area.

3. Noise Impact Analysis

3.1 Setting

Vehicular traffic on County TT/Meadowbrook Road and County D/Sunset Drive, Merrill Hills Road, County X/Genesee Road is the dominant source of noise in the project area. Other environmental noise sources include traffic on other local roadways, yard maintenance activities, construction, occasional aircraft over-flights, trains, and animals (birds chirping, etc). Land use within the study area is primarily residential.

3.2 Measured Noise Levels

Noise level measurements and concurrent traffic counts were conducted at the exterior areas of representative locations along the project corridor at locations M01 to M06 on May 17, 2011 (Exhibit 1 and Table 2). Noise levels at two additional monitoring locations (M07-M08) were obtained on January 10, 2012 for the Golf Course East Alternatives. The noise monitoring locations were selected based on a review of plans and site inspection to determine the locations of sensitive receptors in the project area.

Measurement equipment consisted of a Larson Davis 820 sound level meter. The equipment complies with the requirements of the American National Standards Institute and the

International Electrotechnical Commission for precision sound level measurement instrumentation. Weather conditions during the May 2011 measurements consisted of mostly clear skies (light cloud coverage) and winds less than five miles per hour (mph), with temperatures ranging from 69 to 76°F. Weather conditions during the January 2012 measurements consisted of mostly clear skies and winds less than five mph, with temperatures ranging from 40 to 50 °F.

TABLE 2
Noise Monitoring Locations

Monitoring Location	Site Description	Location
M01	Residence	3200 Woodridge Ave
M02	Vacant lot next to Residence	1610 Rockridge
M03	Residence	3115 Kidson Hill
M04	Residence	27243 W Kame Terrace
M05	Residence	Hawthorne Hollow
M06	Residence	3203 S County Road X Frontage Road
M07	Residence	Genesee Road/Valley View Drive
M08	Golf Course	Merrill Hills Road/Hawthorne Hollow Drive

The purpose of the noise level measurements was to verify the accuracy of the TNM 2.5 for predicting traffic noise exposure within the study area, by providing actual traffic noise levels at specific sites and time periods. The project area was closely inspected to gather input data that would allow accurate modeling of the roadway and receptor locations.

The location of the measurement sites, and existing roadway geometry, vehicle counts, and estimated speeds obtained during the noise measurement periods were input into the noise model. Table 3 compares noise levels obtained during the traffic noise measurements with the levels predicted by the noise model. The agreement between the noise levels measured in the field and noise levels calculated by the noise model serves to calibrate the model, as represented in the “Difference” column in Table 3. A positive difference indicates that noise levels measured in the field are lower than those predicted by the computer model. A negative difference shows that measured noise levels are greater than predicted noise levels.

TABLE 3
Results of Calibration

Monitoring Location	Measured Leq (dBA)	Predicted Leq (dBA)	Difference (dBA)
M01	62.0	60	-2.0
M02	47.3	50	2.7
M03	50.3	52.8	2.5
M04	59.1	56.3	-2.8
M05	44.7	42.3	-2.4
M06	64.4	60.6	-3.8
M07	71.2	71.6	-0.4
M08	60.1	59.5	-0.6

As shown in Table 3, all the receptors are within 3 dBA of those measured with the exception of M06. Such differences show agreement between measured and calculated noise levels, and indicates that the TNM 2.5 may be used to accurately calculate noise exposure in the corridor. The measured noise level at M06 exceeds the level predicted by the model by more than 3 dBA due to construction activity in the vicinity during the measurement.

3.3 Calculated Peak-hour Noise Exposure

An analysis of noise sensitive sites (such as single-family residences) adjacent to the existing and the proposed Waukesha Bypass alternatives was conducted to assess predicted peak-hour traffic noise levels under existing conditions and the preferred alternative design alternatives. Representative receptor locations were chosen throughout the corridor for noise modeling purposes. In most cases, these receptors are representative of a larger number of noise sensitive locations that would experience similar noise levels.

3.3.1 Existing (2010) Peak-Hour Noise Levels

Existing traffic noise levels range from 43 to 70 dBA in areas representative of noise sensitive locations in the study area as summarized in Table 4. Noise levels at the majority of receptors were predicted to be below the WisDOT NLC. Only one location, R47 located on the east side of County TT just north of MacArthur Road, was predicted to currently exceed the NLC under level of service C traffic conditions.

3.3.2 Future (2035) Peak-Hour Noise Levels

Future Build 2035 peak-hour traffic volumes were used to predict worst case noise levels under the build alternatives. Table 4 lists the calculated peak-hour traffic noise levels.

The results of the noise analysis indicate that peak-hour noise levels at exterior activity areas under the Sunset-to-County X Alternative range from 49 to 70 dBA, with increases above existing levels of up to 9 dBA. Under the Pebble Creek Alternative, predicted noise levels would range from 50 to 69 dBA with increases above existing of up to 13 dBA. Under the

Golf Course East Alternative, predicted noise levels would range from 50 to 70 dBA, with increase above existing levels of up to 13 dBA. Under the Golf Course East-Shifted West Alternative, predicted noise levels would range from 50 to 69 dBA, with increase above existing levels of up to 9 dBA. Such increases are below the substantial increase criterion established by WisDOT. In addition, noise levels would decrease under all four build alternatives where traffic is shifted away from sensitive receptors near MacArthur Road.

In general, noise levels between the alternatives are relatively similar due to minor differences in traffic volumes, except at the south end of the study area where the alternatives are on different alignments.

Under all four of the build alternatives, the majority of front row receptors along the west side of Meadowbrook Road between Brookline Court and Arrowhead Trail, including the 11 duplexes located between Woodridge Lane and Joanne Drive, would be impacted due to heavier volumes in the southbound direction. Under all four of the build alternatives, a total of 49 impacts would occur north of MacArthur Road. Under the Sunset-to-County X Alternative south of MacArthur Road, an additional 15 residences would be impacted (Exhibit 2). Under the Pebble Creek Alternative, no additional impacts would occur (Exhibit 3). Under the Golf Course East Alternative south of MacArthur Road, two additional residences would be impacted (Exhibit 4). Under the Golf Course East-Shifted West Alternative, no additional impacts would occur (Exhibit 5 and 6). The Sunset-to-County X Alternative would generate the greatest amount of noise impacts corridor wide, totaling 64 impacts. See Table 4 for a summary of complete impacts by alternative and noise level ranges by alternative.

For a complete summary of future (2035) peak hour noise results by alternative, refer to Appendix A.

TABLE 4
Future (2035) Peak Hour Noise Levels

	Existing	Build Alternative			
		Sunset-to-County X	Pebble Creek	Golf Course East	Golf Course East-Shifted West
Noise Level Range	43-70 dBA	49-70 dBA	50-69 dBA	50-70 dBA	50-69 dBA
Total Impacted Noise Sensitive Locations	NA	64	49	51	49

4. Noise Abatement Analysis

4.1 Wisconsin Noise Abatement Guidelines

According to WisDOT's noise policy, for noise abatement to be implemented, it must be considered feasible and reasonable, meeting the minimum criteria described below.

Feasibility is based on a minimum required sound level reduction and constructability.

- The noise barrier must provide a minimum noise reduction of 5 dBA for at least one impacted receptor.
- The barrier must be compatible with safety, drainage, utilities, and constructability considerations.

The reasonableness evaluation is based on the noise reduction design goal, cost-effectiveness, and viewpoints of the benefited property owners and/or tenants.

- The total cost may not exceed \$30,000 per benefited receiver.
- The noise barrier must achieve a 9 dBA noise reduction design goal at a minimum of one receiver.
- The noise barrier should reduce noise levels by a minimum of 8 dBA's for a receiver or common use area to be considered as benefited for the purposes of determining reasonableness.
- To determine the estimated cost of the noise wall, the total noise wall area is multiplied by \$18 per sq ft.
- If the barrier is determined to meet the design goal and be cost-effective, the viewpoints of the benefited property owners and/or tenants must be solicited to determine the desire for building the noise barrier.

If both feasibility and reasonableness can be met, mitigation measures must be considered by WisDOT for locations that would be impacted by design year noise levels.

4.2 Traffic Noise Abatement Strategies

Noise abatement strategies should be considered at receivers that approach (66 dBA for Category B and C or 71 dBA for Category E) or exceed the NLC.

The following FHWA approved noise abatement may also be considered, where appropriate:

- Constructing noise barriers or earthen berms
- Traffic management measures (eg. Traffic control devices, time-use restrictions, prohibition of certain vehicle types, or modified speed limits).
- Change of roadway's vertical or horizontal alignment
- Acquisition of property for buffer zones
- Acoustic insulation of Activity Category D structures

Of these measures, the noise barrier option is usually the most practical, reasonable, and effective choice. Two common noise barrier options to control exposure from traffic noise impacts are vertical noise barriers and earthen berms. Vertical noise barriers are preferred since earthen berms may require substantial right-of-way acquisition.

To be effective, the noise barriers should be constructed of massive materials, such as masonry or concrete block, and should be continuous without gaps or openings that could result in flanking paths and reduce barrier performance. Other barrier materials may be acceptable but have to be approved by a qualified acoustical consultant.

It should be noted that noise barriers can have their own negative impacts. Barriers may interfere with the passage of air, interrupt scenic views, or create objectionable shadows. They could also create maintenance access problems, make it difficult to maintain landscaping, create drainage problems, or provide pockets for wind-borne trash and garbage to accumulate.

4.3 Noise Barrier Analysis

The TNM was used to determine the noise level reduction provided by various barrier heights along the proposed project. Barriers were evaluated where receptors were predicted to exceed the NLC. The analysis found that barriers would be feasible and meet the reasonableness noise reduction design goal at four of the seven locations. The remaining three barriers would not the reasonableness criteria for cost effectiveness. Preliminary noise barrier locations are presented in the below text. Each barrier is summarized in Table 5 and shown on Exhibit 2 and Exhibit 3.

Barrier 1: Meadowbrook Road (west side) from Silver Nail Road to Woodbridge Lane (Receptors R1- to R7)

The placement of a 1,669 linear-foot barrier was evaluated along the west side of Meadowbrook Road from Woodbridge Lane to Silver Nail Road along the right-of-way for Receptors R1-R7. Under this scenario with a maximum height of 25 feet, none of the residences between Rolling Ridge Road and Woodbridge Lane could achieve an 8-dBA traffic noise reduction needed to be considered benefited receptors. Instead, the barrier length was shortened to 1,013-linear-foot barrier from Rolling Ridge Road to Silver Nail Road along the right-of-way for Receptors R1-R3. Barrier heights between 11 to 23 feet would be required to achieve an 8-11 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness design goals. The total cost to construct the barrier would be \$338,778, or \$67,756 per benefited receptor, which would exceed the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. In addition, this barrier was not included in the cost averaging analysis since the estimated build cost is more than the allowable limit of \$60,000. Therefore, a barrier is not recommended for further analysis at this location.

Barrier 2: Meadowbrook Road (west side) from Woodbridge Lane to Joanne Drive (Receptors R8- to R15)

The placement of a 1,769 linear-foot barrier was evaluated along the west side of Meadowbrook Road from Woodbridge Lane to Joanne Road along the right-of-way for Receptors R8-R15. Barrier heights between 9 to 25 feet would be required to achieve an 8-9 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness design goals. The total cost to construct the barrier would be \$402,678, or \$19,175 per benefited receptor, which would meet the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. As a result, this barrier would be cost-effective as a stand-alone barrier. Therefore, a barrier is recommended for further analysis at this location.

Barrier 3: Meadowbrook Road (west side) from Joanne Road to the end of Arrow Head Trail (Receptors R17- to R21)

The placement of a 2,055 linear-foot barrier was evaluated along the west side of Meadowbrook Road from Joanne Road to the end of Arrow Head Trail along the right-of-way for Receptors R17-R21. Barrier heights between 19 to 25 feet would be required to achieve an 8-10 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness

design goals. The total cost to construct the barrier would be \$784,044, or \$87,116 per benefited receptor, which would exceed the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. In addition, this barrier was not included in the cost averaging analysis since the estimated build cost is more than the allowable limit of \$60,000. Therefore, a barrier is not recommended for further analysis at this location.

Barrier 4: Meadowbrook Road (east side) and south of Coldwater Creek Drive (Receptor R29)

The placement of a 500 linear-foot barrier was evaluated along the east side of Meadowbrook Road and south of Coldwater Creek Drive along the right-of-way for Receptors R29, representing The Lodge Apartments. Barrier heights between 13 to 21 feet would be required to achieve an 8-9 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness design goals. The total cost to construct the barrier would be \$154,800, or \$9,675 per benefited receptor, which would meet the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. As a result, this barrier would be cost-effective as a stand-alone barrier. Therefore, a barrier is recommended for further analysis at this location.

Barrier 5: Meadowbrook Road (west side), north of Madison Street along Jersey Circle (Receptor R32-R34)

The placement of a 104 linear-foot barrier was evaluated along the west side of Meadowbrook Road and north of Madison Street along Jersey Circle along the right-of-way for Receptors R32 and R34. A barrier height of 13 feet would be required to achieve a 9 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness design goals. The total cost to construct the barrier would be \$24,264, or \$24,264 per benefited receptor, which would meet the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. As a result, this barrier would be cost-effective as a stand-alone barrier. Therefore, a barrier is recommended for further analysis at this location.

Barrier 6: Meadowbrook Road (east side), north of Madison Street along Harrogate Drive (Receptor R33-R35)

The placement of a 550 linear-foot barrier was evaluated along the east side of Meadowbrook Road and north of Madison Street along Harrogate Drive along the right-of-way for Receptors R33 and R35. Barrier heights between 9 to 17 feet would be required to achieve an 8-11 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness design goals. The total cost to construct the barrier would be \$148,500, or \$24,750 per benefited receptor, which would meet the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. As a result, this barrier would be cost-effective as a stand-alone barrier. Therefore, a barrier is recommended for further analysis at this location.

Barrier 7: Genesee Road (west side), from West Sunset Drive to Ridge Road (Receptor R51-R57)

The placement of a 2,361 linear-foot barrier was evaluated along the west side of Genesee Road from West Sunset Drive to Ridge Road along the grass median separating Genesee Road from County Road X Receptors R51 and R57. Two breaks in this barrier are required to accommodate road accesses from County Road X to Genesee Road and from County Road X to Ridge Road. Barrier heights between 9 to 21 feet would be required to achieve an 8-10 dBA reduction, satisfying the 8-dBA feasibility and 9-dBA reasonableness design goals. The total cost to construct the barrier would be \$644,436, or \$64,444 per benefited receptor, which would exceed the allowable cost criterion for reasonableness of \$30,000 per benefited receptor. In addition, this barrier was not included in the cost averaging analysis since the

estimated build cost is more than the allowable limit of \$60,000. Therefore, a barrier is not recommended for further analysis at this location.

TABLE 5
Summary of Noise Mitigation: Barrier Descriptions

Barrier	Benefited Receptors	Height (feet)	Length (feet)	Construction Cost	Noise Reduction Potential (dB[A])	Estimated Build Cost Per Benefited Receptor	Allowable Cost Per Benefited Receptor	Likely to be Implemented if Desired by Benefited Receptor	If no, reason why?
1(residences)	5	11-23	1,013	\$338,778	8-11	\$67,756	\$30,000	No	Not part of cost averaging as estimated cost is more than the \$60,000 allowable cost.
2 (residences)	21	9-25	1,769	\$402,678	8-9	\$19,175	\$30,000	Yes	NA
3 (residence)	9	19-25	2,055	\$784,044	8-10	\$87,116	\$30,000	No	Not part of cost averaging as estimated cost is more than the \$60,000 allowable cost.
4 (apartments)	16	13-21	500	\$154,800	8-9	\$9,675	\$30,000	Yes	NA
5 (residences)	1	13	104	\$24,264	9	\$24,264	\$30,000	Yes	NA
6 (residences)	6	9-17	550	\$148,500	8-11	\$24,750	\$30,000	Yes	NA
7 (residences)	10	9-21	2,361	\$644,436	8-11	\$64,444	\$30,000	No	Not part of cost averaging as estimated cost is more than the \$60,000 allowable cost.

Note: NA = Not Applicable

^a Cost estimates were not conducted because the noise barrier analysis could not achieve an 8-dB(A) traffic noise level reduction to meet the design goal criteria.

^b Noise barrier analysis could not achieve the 5 dB(A) noise level reduction to meet feasibility criteria.

4.4 Construction Noise

During construction, noise from construction activities would add to the noise environment in the noise project area. Typical construction equipment includes backhoes, compressors, excavators, and other heavy equipment. The *Roadway Construction Noise Model (RCNM) User's Guide* (Final Report, January 2006, FHWA-HEP-05-054, DOT-VNTSC-FHWA-05-01) indicates that the loudest equipment generally emits noise in the range of 80 to 90 dBA at a distance of 50 feet.

Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours, although some work may be done at night. Mitigation of potential highway construction noise impacts shall incorporate low-cost, easy to implement

measures into project plans and specifications, including equipment muffler requirements and limiting construction activities to daytime hours at specific locations.

5. Conclusions

Existing worst case traffic noise levels range from 43 to 70 dBA, with future levels predicted to increase as the result of the build alternatives. Noise levels under the Sunset-to-County X Alternative range from 49 to 70 dBA and from 50 to 69 dBA under the Pebble Creek and the Golf Course East-Shifted West Alternative. Noise levels under the Golf Course East Alternative are expected to range from 50 to 70 dBA. Increases above existing levels are expected to be below WisDOT's definition of substantial increase (15 dBA increase) for all build alternatives.

The Golf Course East and Golf Course East-Shifted West Alternatives would result in impacts at 51 and 49 noise sensitive locations, respectively; while the Sunset-to-County X and Pebble Creek Alternatives would result 64 and 49 impacted locations, respectively.

The barrier analysis found that barriers would be feasible and meet the reasonableness noise reduction design goal at four of the seven locations. The remaining three barriers would not the reasonableness criteria for cost effectiveness.

6. References

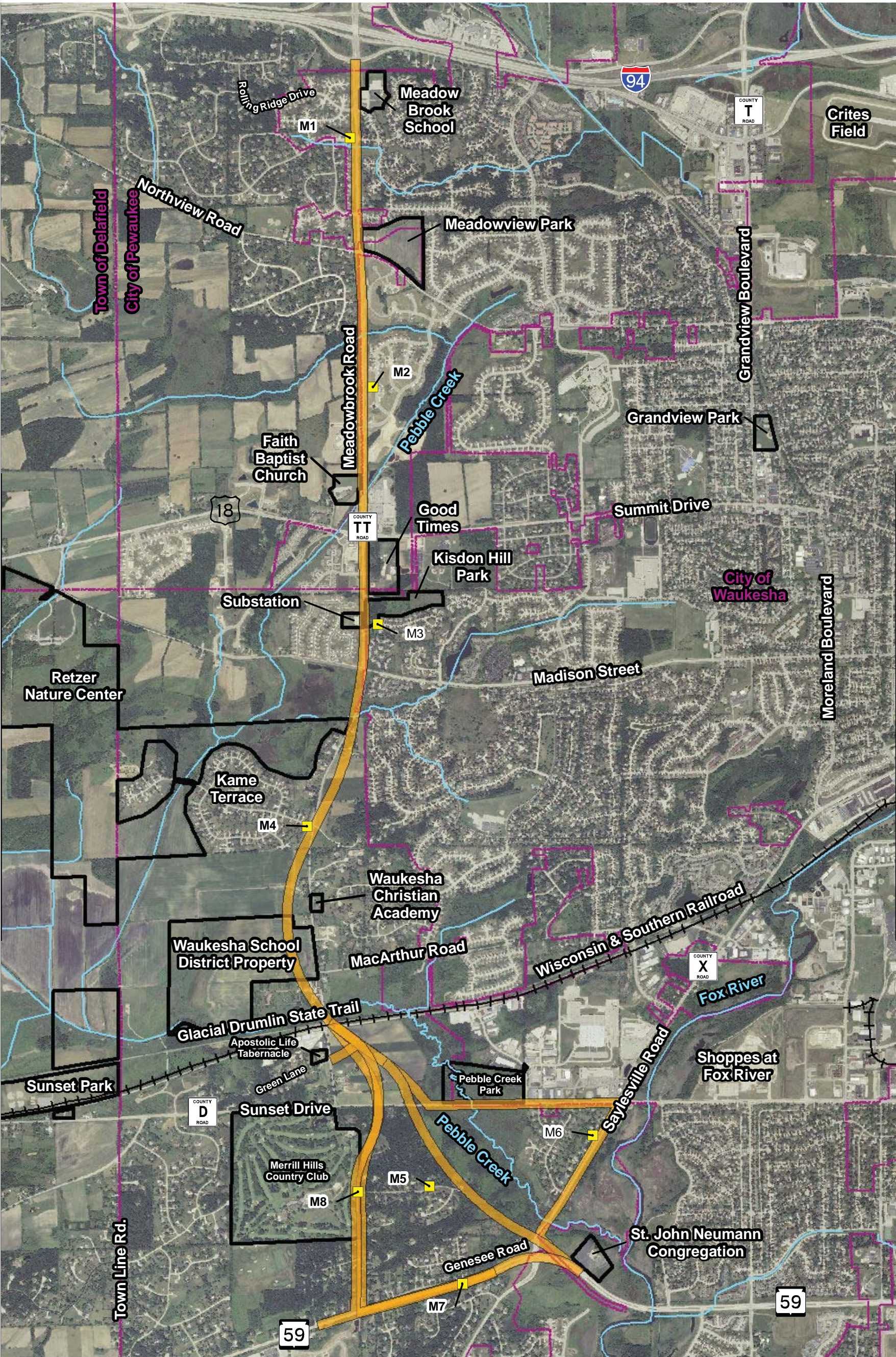
Code of Federal Regulations [CFR], FHWA 2011. Title 23 CFR Part 772 *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.

Federal Highway Administration. 2006. *Roadway Construction Noise Manual*. Version 1.1

Wisconsin Department of Transportation, 2011. *Wisconsin Administrative Code, Transportation Chapter 405: Siting Noise Barriers*.

Federal Highway Administration (FHWA). 2004. *Traffic Noise Model (TNM)*. Version 2.5. April 2004.

Exhibits

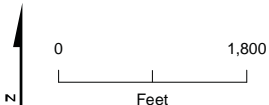


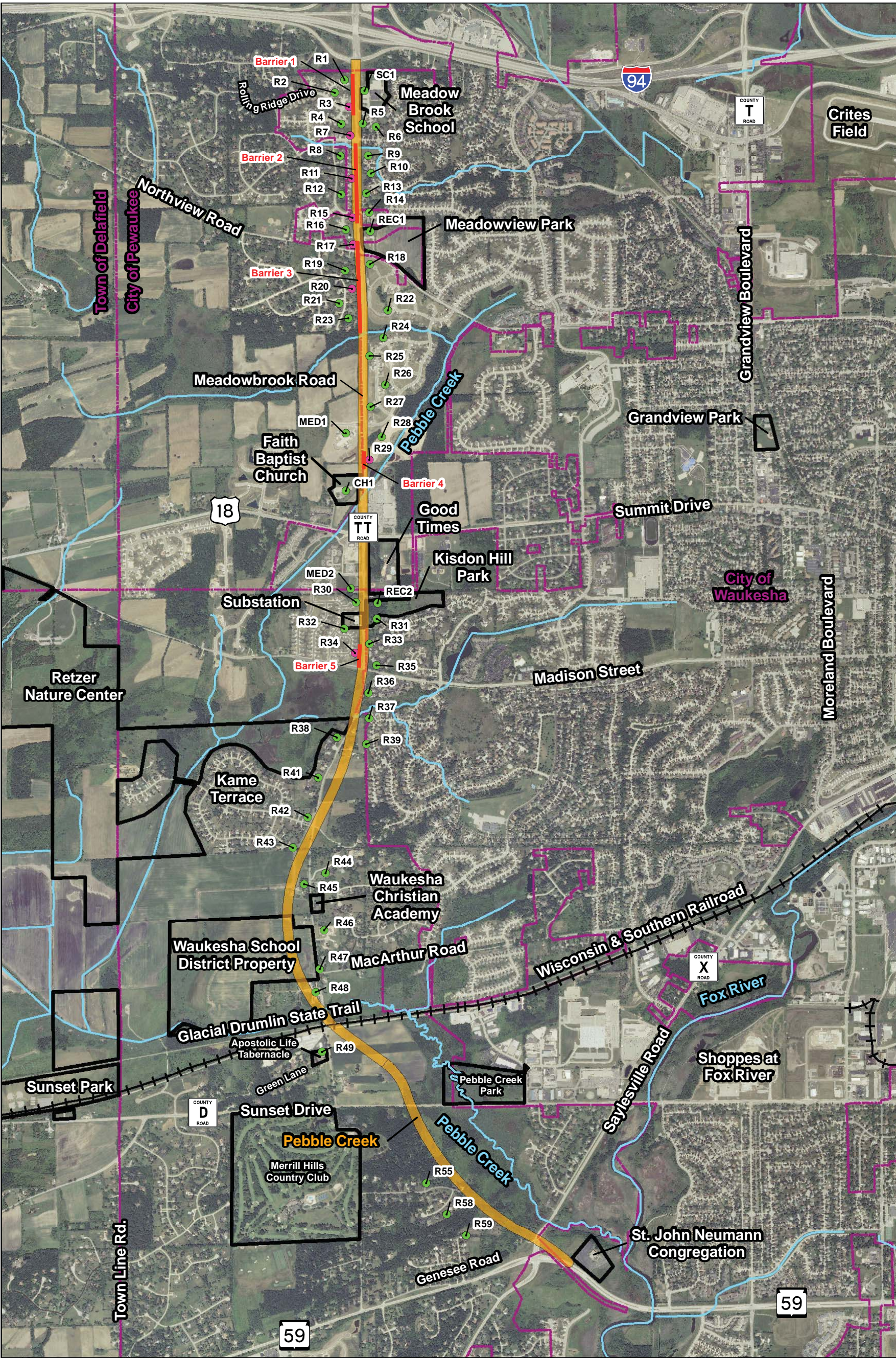
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Noise Receptors

Not Impacted

Impacted

River/Stream



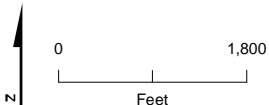
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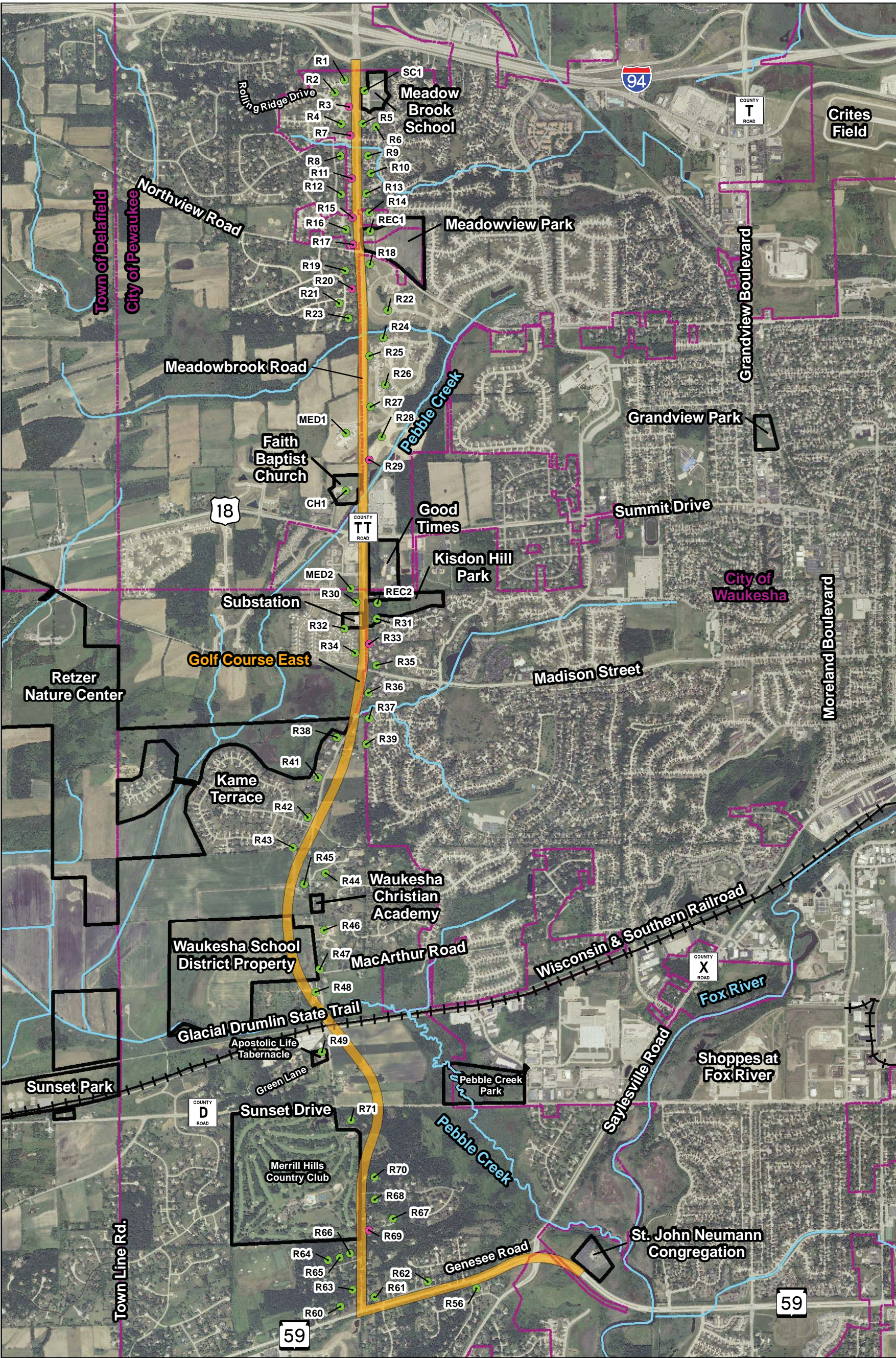
Noise Receptors

Not Impacted

Impacted

River/Stream

Railroad



Legend

Noise Receptors

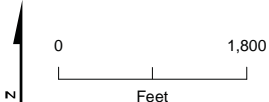
Not Impacted

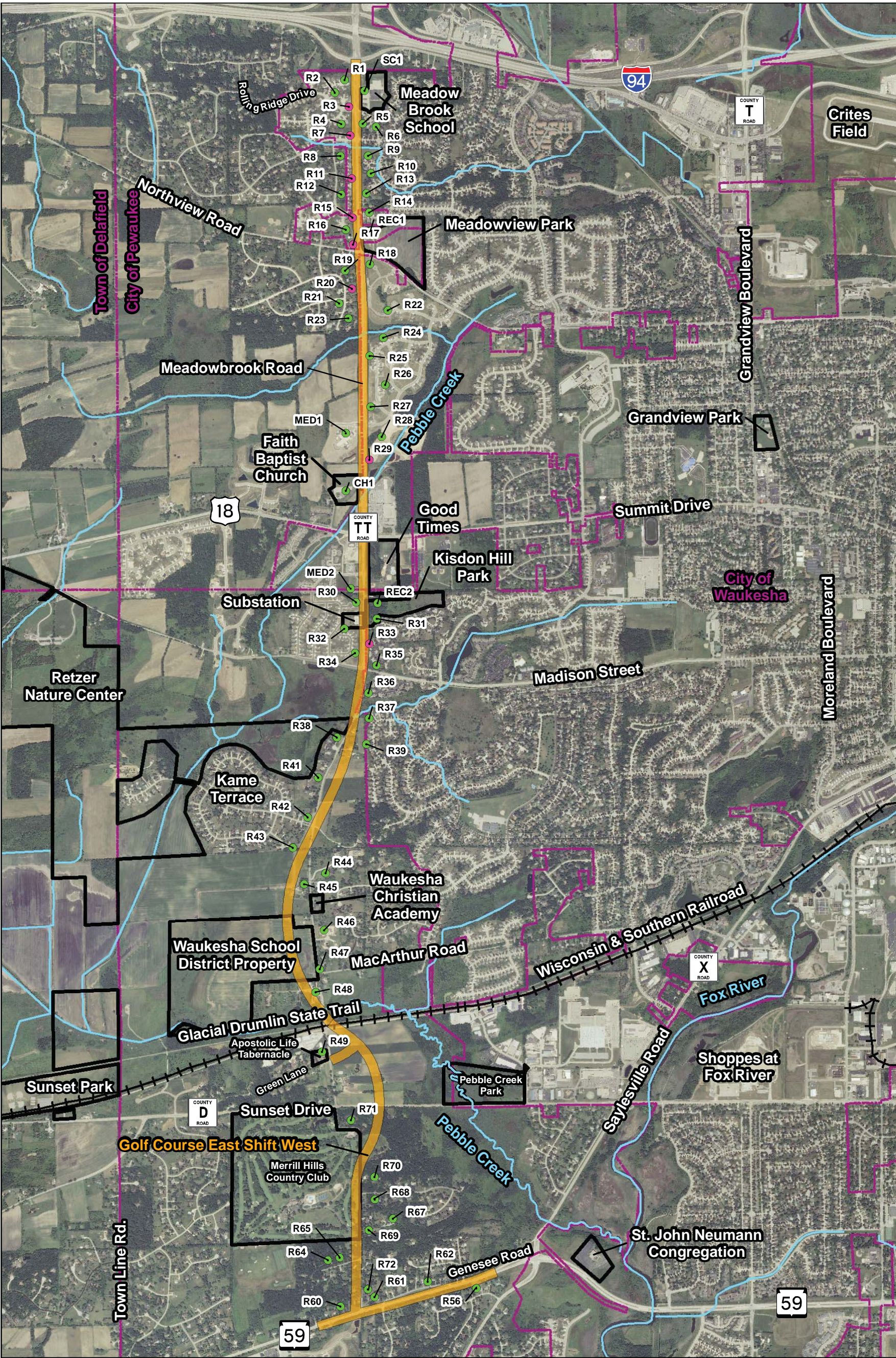
Impacted

River/Stream

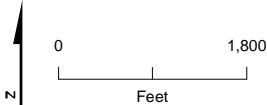
Railroad

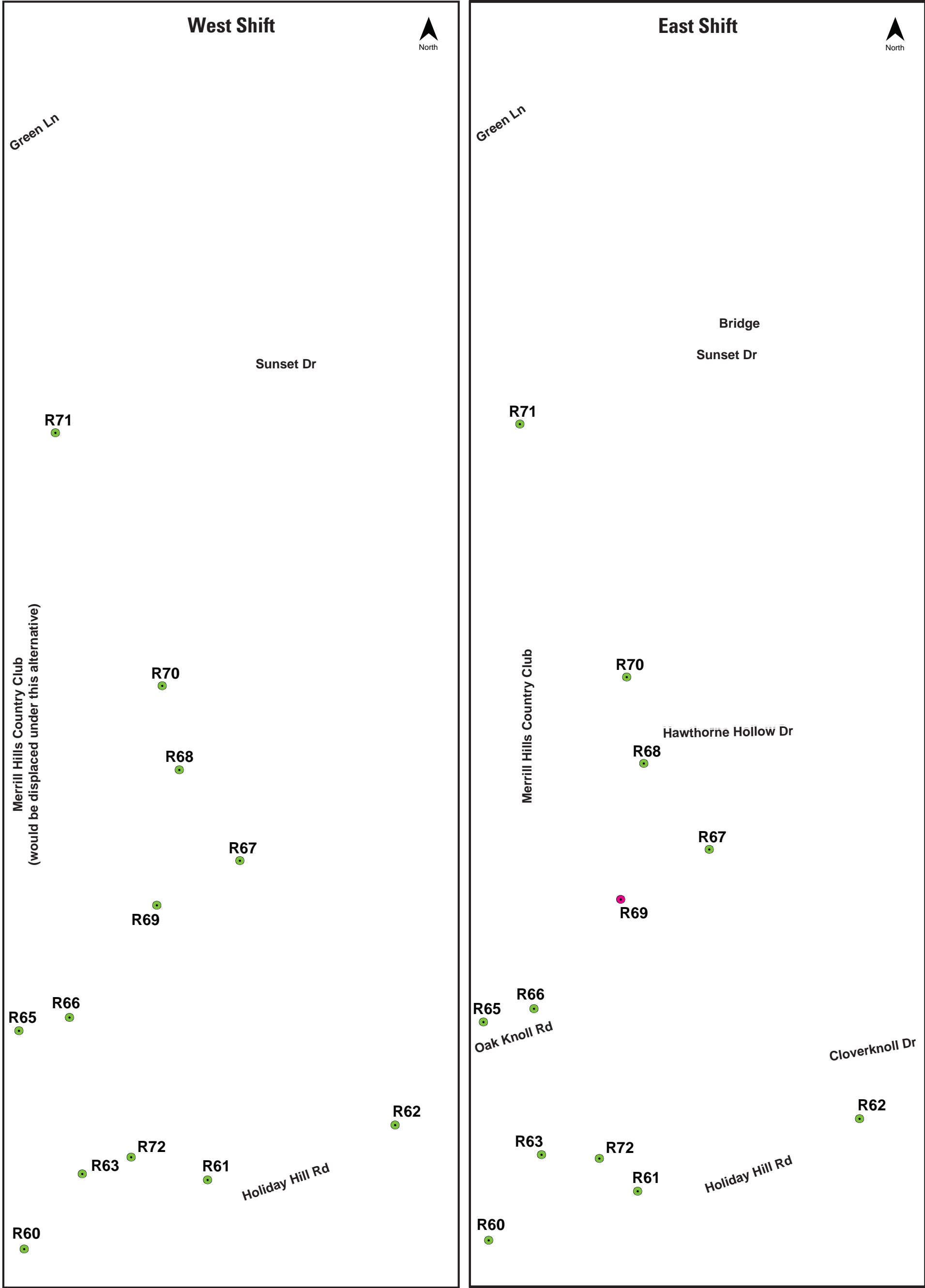
Municipal Boundary





- Legend
- | | | |
|-----------------|--------------|--------------------|
| Noise Receptors | River/Stream | |
| ● Not Impacted | + | Railroad |
| ● Impacted | + | Municipal Boundary |





Appendix A

Appendix A: Summary of Peak Hour Noise Levels

Receiver	# of Receptors Represented	NLC	Existing (dBA) 2010	Preferred Alternative- Sunset to CTH X Option (dBA) 2035	Distance from Receptor to Nearest Proposed Roadway (feet)	Preferred Alternative- Pebble Creek Option (dBA) 2035	Distance from Receptor to Nearest Proposed Roadway (feet)	Preferred Alternative- Golf Course East Option (dBA) 2035	Distance from Receptor to Nearest Proposed Roadway (feet)	Preferred Alternative-Golf Course East (Shifted West) Option (dba) 2035	Distance from Receptor to Nearest Proposed Roadway (feet)	Build Increase Above Existing- Sunset to CTH X	Build Increase Above Existing- Pebble Creek	Build Increase Above Existing- Golf Course East	Build Increase Above Existing-Golf Course East (Farther West)
R01	3	66	56	61	229	61	229	61	229	61	229	5	5	5	5
R02	6	66	50	55	426	56	426	56	426	56	426	5	6	6	6
R03	5	66	59	<u>66</u>	139	<u>66</u>	139	<u>66</u>	139	<u>66</u>	139	7	7	7	7
R04	4	66	53	59	301	59	301	59	301	59	301	6	6	6	6
R05	7	66	60	65	143	65	143	65	143	65	143	5	5	5	5
R06	7	66	50	56	411	56	411	56	411	56	411	6	6	6	6
R07	1	66	60	<u>67</u>	117	<u>67</u>	117	<u>67</u>	117	<u>67</u>	117	7	7	7	7
R08	5	66	52	58	321	58	321	58	321	58	321	6	6	6	6
R09	2	66	54	59	248	59	248	59	248	59	248	5	5	5	5
R10	2	66	52	57	301	57	301	57	301	57	301	5	5	5	5
R11	22	66	61	<u>68</u>	95	<u>69</u>	95	<u>69</u>	95	<u>69</u>	95	7	8	8	8
R12	3	66	52	58	308	58	308	58	308	58	308	6	6	6	6
R13	3	66	57	61	202	62	202	62	202	62	202	4	5	5	5
R14	3	66	55	60	250	60	250	60	250	60	250	5	5	5	5
R15	1	66	61	<u>68</u>	100	<u>69</u>	100	<u>69</u>	100	<u>69</u>	100	7	8	8	8
R16	3	66	55	61	250	61	250	61	250	61	250	6	6	6	6
R17	2	66	61	<u>67</u>	117	<u>68</u>	117	<u>68</u>	117	<u>68</u>	117	6	7	7	7
R18	1	66	59	63	201	63	201	63	201	63	201	4	4	4	4
R19	2	66	54	60	311	61	311	61	311	61	311	6	7	7	7
R20	4	66	58	<u>67</u>	194	<u>67</u>	194	<u>67</u>	194	<u>67</u>	194	9	9	9	9
R21	4	66	52	58	471	58	471	58	471	58	471	6	6	6	6
R22	6	66	50	54	516	55	516	55	516	55	516	4	5	5	5
R23	2	66	57	63	287	63	287	63	287	63	287	6	6	6	6
R24	3	66	53	56	420	57	420	57	420	57	420	3	4	4	4
R25	7	66	61	65	141	65	141	65	141	65	141	4	4	4	4
R26	11	66	49	53	464	53	464	53	464	53	464	4	4	4	4
R27	3	66	57	60	161	61	161	61	161	61	161	3	4	4	4
R28	20	66	51	55	385	55	385	55	385	55	385	4	4	4	4
R29	16	66	63	<u>66</u>	132	<u>66</u>	132	<u>66</u>	132	<u>66</u>	132	3	3	3	3
R30	1	66	60	64	158	64	158	64	158	64	158	4	4	4	4

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R31	2	66	56	63	264	63	264	63	264	63	264	7	7	7	7
R32	8	66	53	58	401	58	401	58	401	58	401	5	5	5	5
R33	4	66	62	<u>68</u>	113	<u>68</u>	113	<u>68</u>	113	<u>68</u>	113	6	6	6	6
R34	6	66	57	65	175	<u>66</u>	175	<u>66</u>	175	<u>66</u>	175	8	9	8	8
R35	6	66	59	62	285	63	285	63	285	63	285	3	4	4	4
R36	6	66	64	64	205	65	205	65	205	65	205	0	1	1	1
R37	2	66	55	58	310	58	310	58	310	58	310	3	3	3	3
R38	6	66	60	63	270	64	270	64	270	64	270	3	4	4	4
R39	4	66	51	57	351	57	351	57	351	57	351	6	6	6	6
R40	Acq	66	----	Acq	----	Acq	----	Acq	----	Acq	----	----	----	----	----
R41	5	66	61	58	380	58	380	59	380	59	380	-3	-3	-2	-2
R42	2	66	58	61	217	61	217	61	217	61	217	3	3	3	3
R43	1	66	53	60	212	60	212	60	212	60	212	7	7	7	7
R44	2	66	54	54	612	55	612	55	612	55	612	0	1	1	1
R45	7	66	63	59	267	60	267	60	267	60	267	-4	-3	-3	-3
R46	2	66	57	49	743	50	743	50	743	50	743	-8	-7	-7	-7
R47	3	66	70	56	440	57	440	57	440	57	440	-14	-13	-13	-13
R48	5	66	60	53	142	54	142	54	142	54	142	-7	-6	-6	-6
R49	1	66	60	50	529	51	583	52	504	53	263	-10	-9	-8	-7
R50	7	66	60	65	161	--	--	--	--	--	--	5	--	--	--
R51	3	66	63	<u>67</u>	217	--	--	--	--	--	--	4	--	--	--
R52	7	66	54	58	520	--	--	--	--	--	--	4	--	--	--
R53	6	66	61	<u>67</u>	178	--	--	--	--	--	--	6	--	--	--
R54	3	66	50	53	743	--	--	--	--	--	--	3	--	--	--
R55	1	66	43	--	--	56	434	--	--	--	--	--	13	--	--
R56	10	66	58	--	--	--	--	59	186	61	186	--	--	1	3
R57	6	66	65	<u>70</u>	121	--	--	--	--	--	--	5	--	--	--
R58	2	66	44	--	--	55	606	--	--	--	--	--	11	--	--
R59	3	66	48	--	--	55	659	--	--	--	--	--	7	--	--
R60	1	66	58	--	--	--	--	59	485	60	279	--	--	1	2

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R61	3	66	59	--	--	--	--	63	238	61	238	--	--	4	2
R62	12	66	58	--	--	--	--	59	247	60	247	--	--	1	2
R63	4	66	57	--	--	--	--	61	237	Acq	-----	--	--	4	-----
R64	2	66	48	--	--	--	--	52	746	55	545	--	--	4	7
R65	2	66	50	--	--	--	--	56	500	59	304	--	--	6	9
R66	4	66	54	--	--	--	--	59	291	Acq	-----	--	--	5	-----
R67	2	66	47	--	--	--	--	54	582	52	780	--	--	7	5
R68	2	66	55	--	--	--	--	61	205	57	405	--	--	6	2
R69	4	66	57	--	--	--	--	<u>70</u>	85	59	287	--	--	13	2
R70	2	66	52	--	--	--	--	61	193	57	380	--	--	9	5
R71	3	66	60	--	--	--	--	60	535	60	539	--	--	0	0
R72	1	66	59	--	--	--	--	Acq	-----	61	276	--	--	-----	2
SC1	1	66	52	58	180	58	180	58	180	58	180	6	6	6	6
REC1	1	66	55	59	249	59	249	59	249	59	249	4	4	4	4
REC2	1	66	56	63	285	63	285	63	285	63	285	7	7	7	7
CH1	1	66	54	59	253	60	253	60	253	59	253	5	6	6	6
MED1	1	66	54	59	354	59	354	59	354	59	354	5	5	5	5
MED2	1	66	55	60	313	60	313	60	313	60	313	5	5	5	5

-- signifies that the receptor is outside of the range of influence of the Build Alternative.

Acq: signifies that the receptor is acquired under the Build Alternative.

R= residence

SC= school

REC= park

CH= church

MED=medical facility

RARE REPTILE REVIEW

For

**West Waukesha Bypass
I-94 to WIS 59
Waukesha County, WI
WisDOT Project I.D. 2788-01-00**

April 23, 2012

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Blanding's turtle, Waukesha County. Photo © G. S. Casper

1. Background

Waukesha County, in cooperation with the Federal Highway Administration and the Wisconsin Department of Transportation (WisDOT), is preparing an Environmental Impact Statement (EIS) for transportation improvements between IH-94 and WIS 59 on the west side of the City of Waukesha. The objective is to provide a north-south link between IH-94 and WIS 59 that will complete the existing partial circumferential “beltline” around the City of Waukesha. The EIS will evaluate alternatives for providing a north-south arterial highway between IH-94 and WIS 59 using a combination of existing highways and new alignments.

The alternatives addressed in this study are shown in Figure 1 and addressed in planning documents (<http://waukeshabypass.org/>). The Natural Heritage Inventory lists 23 element occurrences for township Tier 6 North, Range 19 East (Appendix A), including 1 amphibian, 7 plants, 3 mussels, a bird rookery, 6 natural communities, 2 reptiles, and 3 fish. Of these, 13 were called out as being within or near the study area in Wisconsin Department of Natural Resources (WDNR) Endangered Resource reviews (Table 1; Millmann 2005, 2010). Pebble Creek is also classified as a trout stream, and the study area contains the Pebble Creek Natural Area and primary environmental corridor.

This study addresses the state-listed reptile species identified in the project area by the Endangered Resource Reviews: Blanding’s turtle (*Emydoidea blandingii*) and Butler’s gartersnake (*Thamnophis butleri*). These species were determined to be present within the anticipated project area by the WDNR, Bureau of Endangered Resources (Millmann, *op. cit.*). Critical habitat for these species in the project area is assessed, and recommendations made on avoidance and conservation measures, including measures WisDOT may incorporate into construction contract special provisions to eliminate or reduce impacts. Information provided may be utilized for an Incidental Take Authorization (if required) in consultation with the WDNR, Bureau of Endangered Resources. More general wildlife conservation and biodiversity issues are also discussed, with several other species of conservation interest identified.

Table 1: Wisconsin Natural Heritage Inventory Elements for the Study Area

Common Name	Scientific Name	Status
Elktoe mussel	<i>Alasmidonta marginata</i>	Special Concern Mussel
Slippershell mussel	<i>Alasmidonta viridis</i>	Threatened Mussel
Blanding's turtle	<i>Emydoidea blandingii</i>	Threatened Turtle
Butler's gartersnake	<i>Thamnophis butleri</i>	Threatened Snake
Lake chubsucker	<i>Erimyzon sucetta</i>	Special Concern Fish
Common bog arrow	<i>Triglochin maritima</i>	Special Concern Plant
Forked aster	<i>Aster furcatus</i>	Threatened Plant
Northern yellow lady's slipper	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Special Concern Plant
Small white lady's slipper	<i>Cypripedium candidum</i>	Threatened Plant
Swamp agrimony	<i>Agrimonia parviflora</i>	Special Concern Plant
Yellow evening primrose	<i>Calylophus serrulatus</i>	Special Concern Plant
Mesic prairie		Special Concern Community
Southern dry forest		Special Concern Community

2. Methods

The geographic focus of this study was on the preliminary alternatives proposed in the area along Pebble Creek, from MacArthur Road to the confluence with the Fox River (Figure 1; Tier 6 North, Range 19 East, Sections 7, 8, 9, 16, 17 and 18). In addition to the WDNR Endangered Resource reviews, data were examined from the Wisconsin Herp Atlas (UWM Field Station), the State Wildlife Action Plan (WDNR 2005), and observations were provided by the Southeastern Wisconsin Regional Planning Commission (SEWRPC). A field inspection was made on 2 December 2011 to examine habitat conditions (no snow cover was present). Environmental and alternatives data were provided in GIS format by CH2M Hill and SEWRPC.

3. Results

3.1 Overall Review

No amphibians or reptiles were observed on the site visit, as all were in winter dens sites and not detectable at the time. Numerous crayfish burrows were observed in the Pebble Creek floodplain, probably occupied by the state Special Concern prairie crayfish (*Procambarus gracilis*), and/or the devil crayfish (*Cambarus diogenes*). These are primary burrowing

species (Hobbs and Jass 1988) which build extensive networks of underground burrows topped by “chimneys” of excavated mudballs. These burrows are important habitat for many other wildlife species, serving as summer drought retreats, winter den sites, and year round shelter for numerous frogs, snakes, salamanders and insects. Spring trapping surveys could determine the crayfish species.

Many species were determined as potentially present based on the assessment, as without dedicated surveys their presence cannot be known with certainty. Databases queried, such as the Wisconsin Natural Heritage Inventory and Wisconsin Herp Atlas, are presence-only data, which have many Type II (false absences) and occasional Type I (false presences) errors, so interpretation of these data requires careful scrutiny and qualitative assessment of Type II errors based on habitat present and species’ known ranges and habitat preferences. For example, while no records exist for prairie crayfish in the project area, the habitat is suitable, within the known range, and there is ample evidence of the presence of some species of burrowing crayfish based on observed burrows, so their presence is considered highly likely, but cannot be confirmed without actual surveys or an incidental record. Records are available for the two state Threatened reptile species (Blanding’s turtle, Butler’s gartersnake) from the Pebble Creek corridor.

The data review produced a list of 27 species of amphibians and reptiles potentially native to the project area (Table 2). Of these, one is considered extirpated (state Endangered Blanchard’s cricket frog), two are state Threatened (Blanding’s turtle, Butler’s gartersnake), and four are ranked as Special Concern (American bullfrog, pickerel frog, northern leopard frog, plains gartersnake). One crayfish and one mammal were also identified as potentially present species of conservation concern. The status of Butler’s and plains gartersnakes in the area is complicated with recent research indicating that both species, hybrids and/or an unclassified taxa may be present (Fitzpatrick et al. 2008, Placyk et al. 2012).

3.2 Blanding’s Turtle Review

Blanding’s turtles occupy various wetland types, but are most common in wetlands with abundant vegetation which support their primarily invertebrate food base, especially crayfish. They occupy both permanent and temporary wetlands, but favor shallow temporary wetlands in early spring when fat reserves depleted during winter dormancy are restored by exploiting abundant aquatic invertebrates and amphibians in warm shallow temporary wetlands. Hibernation typically takes place in more permanent or flowing water, or springs, but is sometimes semi-terrestrial, by burrowing under sedge hummocks. Other critical habitat components include nesting areas of well drained sand or gravel soils with good sun exposure, and terrestrial foraging areas in woodlands and meadows typically utilized in mid-to late- summer. Blanding’s turtles often move considerable distances, especially during nesting season. Turtle movements between all these habitat components can be easily compromised by impassable anthropomorphic barriers such as roads and large expanses of developed areas (i.e. parking lots, subdivisions, golf courses, agriculture). In southeastern Wisconsin, Blanding’s turtles are therefore typically constrained to stream corridors where

habitat connectivity is more intact, and in all but the largest remaining natural areas they are highly endangered.

In the project area Blanding's turtles are known from the Pebble Creek environmental corridor from observational data (Wisconsin Herp Atlas) and can be assumed to also occupy the contiguous Fox River environmental corridor. Detailed assessment of critical habitat use areas and movement corridors is best evaluated by obtaining several seasons of radio tracking data to document the habitat use and movement patterns of individual turtles, which data have not been collected. However, based on available habitat and known life history features of the species (Ernst and Lovich 2009), turtles on this landscape most likely prefer the slow backwaters of the Fox River, and shallow floodplain basins along Pebble Creek and the Fox River, occasionally entering the main stream channels, especially for winter dormancy. They probably utilize all wetland types in these stream corridors during various times of the year, as well as upland meadows, woodlots and shrub habitats in mid- to late- summer. Nesting may occur anywhere dry, well drained, sun exposed soils are sparsely vegetated, and could include roadside shoulders, railroad embankments, gravel driveways, residential gardens, and dry hillsides.

3.3 Butler's Gartersnake Review

Systematic surveys have not been conducted for Butler's gartersnakes throughout the study area, but they are known from the Pebble Creek environmental corridor and Pebble Creek Wetlands Natural Area (unpublished data, WDNR, Wisconsin Herp Atlas), and likely occur in suitable habitat throughout the Fox River environmental corridor as well (Figure 2). Butler's gartersnakes utilize all wetland types except aquatic (standing water) habitats, but prefer open canopy habitats with established ground cover of grasses and forbs. They also utilize most types of grassland and shrub uplands, so long as suitable denning sites are nearby. They typically are most abundant in low-lying grassland and shrubland adjacent to open wetland types such as sedge meadow and wet prairie, or similar habitats in stream floodplains, where denning sites are provided mostly by burrowing crayfish. In the project area, suitable habitat is constrained mostly by roads and developments, but the highest quality habitat lies along Pebble Creek immediately north and south of Sunset Dr., where low lying and diverse grassland/shrub habitat is riddled with crayfish burrows providing summer refuges and winter den sites for the snakes. The Pebble Creek Wetlands Natural Area includes some, but not of all, of this highest quality habitat area. Habitat quality is more compromised along the Fox River, being first more constrained in area by adjacent development, and second being more wooded, with less ground vegetation, and having more dense stands of reed canary grass (*Phalaris arundinacea*) and cattail (*Typha* sp.) that do not provide the structural diversity preferred by snakes.

Table 2. Amphibian, Reptile, Mammal and Crayfish Assessment in the Project Area.

Common Name	Scientific Name	Status*	Status in study area
AMPHIBIANS			
Blanchard's cricket frog	<i>Acris blanchardi</i>	END, SGCN	Extirpated
Eastern American toad	<i>Anaxyrus americanus americanus</i>		Probably common, but no records available
Cope's gray treefrog	<i>Hyla chrysoscelis</i>		Probably rare, but no records available
Gray treefrog	<i>Hyla versicolor</i>		Probably locally common, but no records available
American bullfrog	<i>Lithobates catesbeianus</i>	SG	Probably common, but no records available
Northern green frog	<i>Lithobates clamitans melanota</i>		Probably common, but few records available
Pickerel frog	<i>Lithobates palustris</i>	SC, SGCN	Unknown, probably rare or absent
Northern leopard frog	<i>Lithobates pipiens</i>	SC	Probably locally common, but only old records available
Wood frog	<i>Lithobates sylvaticus</i>		Unknown, probably rare or absent
Spring peeper	<i>Pseudacris crucifer</i>		Probably locally uncommon, no records available
Chorus frog	<i>Pseudacris maculata / triseriata</i>	SGCN	Probably common, but only old records available. The taxonomy of this species complex is uncertain in this region (Lemmon et al. 2007).
Blue-spotted salamander	<i>Ambystoma laterale</i>		Probably locally common, but no records available
Spotted salamander	<i>Ambystoma maculatum</i>		Unknown, probably rare or absent
Eastern tiger salamander	<i>Ambystoma tigrinum</i>		Probably locally common, but no records available
Central newt	<i>Notophthalmus viridescens louisianensis</i>		Unknown, probably rare or absent
REPTILES			
Eastern milksnake	<i>Lampropeltis triangulum triangulum</i>		Probably locally uncommon, only general records available
Smooth greensnake	<i>Opheodrys vernalis</i>		Probably rare or absent, but no records available
Dekay's brownsnake	<i>Storeria dekayi</i>		Probably locally common, only general records available
Northern red-bellied snake	<i>Storeria occipitomaculata occipitomaculata</i>		Unknown, possibly locally common, but no records available
Butler's gartersnake	<i>Thamnophis butleri</i>	THR, SGCN	Locally common, but taxonomy uncertain (Placyk et al. 2012)
Plains gartersnake	<i>Thamnophis radix</i>	SC	Unknown, possibly locally uncommon, but taxonomy uncertain (Placyk et al. 2012)
Eastern gartersnake	<i>Thamnophis sirtalis sirtalis</i>		Probably locally common, but no records available
Eastern spiny softshell	<i>Apalone spinifera spinifera</i>		Probably locally uncommon in Fox River and Pebble Creek, but no records available
Eastern snapping turtle	<i>Chelydra serpentina serpentina</i>		Probably locally common, but no records available

Table 2. Amphibian, Reptile, Mammal and Crayfish Assessment in the Project Area.

Common Name	Scientific Name	Status*	Status in study area
Midland painted turtle	<i>Chrysemys picta marginata</i>		Probably locally common, but no records available
Blanding's turtle	<i>Emydoidea blandingii</i>	THR, SGCN	Locally rare, one record available
Eastern musk turtle	<i>Sternotherus odoratus</i>		Probably locally uncommon in Fox River and Pebble Creek, but no records available
MAMMALS			
Least weasel	<i>Mustela nivalis</i>	SC	Probably locally common, but no records available
CRAYFISH			
Prairie crayfish	<i>Procambarus gracilis</i>	SC	Many burrows present that are probably this species, no surveys performed

* - END = Endangered (Wisconsin Natural Heritage Working List), SC = Special Concern (Wisconsin Natural Heritage Working List), SGCN = Species of Greatest Conservation Need (State Wildlife Action Plan), THR = Threatened (Wisconsin Natural Heritage Working List)

4. Alternatives Analysis

4.1 Golf Course East

The Golf Course East alignment alternative (Figure 1) would have the least environmental impact on the rare reptiles and other resources reviewed, as impacts to existing habitat would be limited to the Pebble Creek stream crossings south of MacArthur and Northview roads, which can be adequately mitigated by proper designs for wildlife ecopassages.

4.2 Pebble Creek West/Far West

The Pebble Creek West/Far West alignment alternative (Figure 1) would have the second least environmental impact on the rare reptiles and other resources reviewed. Impacts are limited to, a) further constraining the western extent of the existing contiguous Pebble Creek habitat area between County Hwy X and MacArthur Road with a new roadway barrier (thereby reducing the contiguous habitat area available by disconnecting the upland habitats on top of the western slope from the stream valley habitats); b) additional noise, air and light pollution; and c) potential alterations to ground water flow, floodplain hydrology, and increased water pollution.

From island biogeography theory (MacArthur and Wilson 1967) we know that the following factors influence species richness in a habitat patch:

- a) degree of isolation (richness declines with increasing distance to nearest neighboring habitat patch, and with the difficulty of traversing possible connecting corridors)
- b) length of isolation (richness declines with time as species are extirpated)
- c) size (larger area usually facilitates higher richness, by reducing the probability of extinction due to chance events and providing greater habitat diversity)

- d) habitat suitability (richness increases with habitat diversity and quality)
- e) initial species composition at the time of isolation (founder effect)
- f) location relative to species movement patterns (higher richness where connecting habitat corridors are available)
- g) serendipity (the impacts of chance arrivals)
- h) human activity (which may assist immigration, or suppress population levels)

From population biology, we know that smaller habitat patches support smaller and fewer populations owing to resource constraints (less space, less food, less habitat diversity). The extirpation of any particular species, or the degree of population reduction that would result from a particular reduction in habitat size, is hard to predict with many parameters influencing reduction rates. However, in most urban settings where habitat patches are slowly reduced in size by development whittling away at their edges over time, the cumulative effect is quite predictable. The typical pattern is a rapid loss of more sensitive species, followed by more gradual losses of more tolerant species, until a plateau of lower species diversity is reached. This pattern of species losses has been documented in Milwaukee County for floristic, breeding bird, amphibian and reptile species richness (Leitner et al. 2008), and should apply equally well to mammal, fish, and invertebrate species richness.

The Pebble Creek West/Far West alignment alternative is therefore expected to contribute to further reductions in overall species diversity supported in the Pebble Creek valley habitat patch, by increasing isolation and decreasing habitat area. This process of habitat reduction has been cumulative and progressive on this landscape for many decades, and historically occurring species such as black bear (*Ursus americanus*) and bobcat (*Lynx rufus*) have long since been lost, suggesting that an initial rapid loss of species richness has already played out. Of the likely remaining species, further habitat losses will disproportionately affect species which have relatively larger habitat area requirements (such as the state Threatened Blanding's turtle and potentially occurring Special Concern least weasel), and sensitive species requiring particular habitats more affected by this alignment (i.e. upland forest, open woodland and shrubby edge habitat), including potentially occurring breeding birds such as the state Special Concern yellow-billed cuckoo (*Coccyzus americanus*), red-headed woodpecker (*Melanerpes erythrocephalus*) and brown thrasher (*Toxostoma rufum*). Blanding's turtles are also at risk from traffic mortality, especially during the nesting season when they travel upslope to seek dry sunny nesting sites. This alignment would attract nesting turtles to the dry gravel road shoulders, so precautions (barriers) are warranted to prevent turtles from accessing the traffic lanes. The amount of Butler's gartersnake habitat loss expected from this alignment is fairly limited and is not considered significant to the species population viability (Figure 2).

Potential alterations to ground water flow from the slope west of the Pebble Creek valley could affect water quality, water temperature, and soil and vegetation characteristics downslope. These in turn are important habitat quality and suitability criteria for many wildlife species, such as coldwater fishes, the burrowing crayfish and the Threatened Butler's gartersnake. Burrowing crayfish utilize friable (easily crumbled) soils with shallow water

tables for building burrows which provide retreats and successful overwintering for many other species. Shallow water tables also keep prey such as earthworms available near the surface for species such as Butler's gartersnake, American woodcock (*Scolopax minor*), and star-nosed mole (*Condylura cristata*). Changes in vegetative communities following changes in soil saturation can also affect a variety of species in differing ways, especially where invasive species may encroach and reduce structural and biotic diversity. Therefore extra care should be taken to ensure that soil and ground water characteristics of this system are preserved. Some of these concerns could be mitigated to some extent as described below.

4.3 Sunset-to-County X

Of the alternative alignments reviewed, the Sunset-to-County X alternative (Figure 1) would have the most environmental impact on the rare reptiles and other resources reviewed. This alternative would reduce the habitat area available by expanding the width of Sunset Drive, thereby degrading the existing Pebble Creek Wetlands Natural Area with an expanded barrier to wildlife movements, and further decrease adjacent habitat quality with additional noise, air and light pollution, and potentially alter ground water flow, floodplain hydrology, and increase water pollution. Alterations to ground water flow and floodplain hydrology could be particularly detrimental to existing floodplain vegetation communities and species such as burrowing crayfish and Butler's gartersnake which are dependant upon the existing water table for portions of their life cycle. Some of these concerns could be mitigated to some extent as described below.

5. Conservation Recommendations

Provisions to eliminate, reduce and monitor impacts to the species assessed are addressed here. These conservation measures include: ecopassages, habitat avoidance, exclusion barriers, habitat management and monitoring for quality assurance (Millmann 2005). The primary objective is to ensure that the viability of the Threatened Species and the communities upon which they depend are not likely to be compromised by the project.

5.1. Ecopassages

Wherever there is habitat on both sides of an existing or proposed roadway, ecopassages are recommended so that wildlife can safely pass under the road. This allows for continued genetic exchange across roadways, use of habitat areas on both sides of the roadway during the normal life cycle of wildlife species, and increases traffic safety by reducing automobile-wildlife collisions. Properly designed ecopassages with well placed barriers are used by many wildlife species that cause extensive and costly damage to automobiles every year. In southeastern Wisconsin species that have been observed using ecopassages include deer, raccoon, opossum, woodchuck, house cat, weasels, mink, gray squirrel, turtles, snakes and frogs.

Ecopassage designs are recommended for all stream crossings on the project, with additional ecopassages placed in strategic upland areas at important habitat areas (Figure 3). The exact placement and design of these ecopassages should be addressed in final design stages, when alignments are known. In general, ecopassages are usually placed at low points on the landscape, including along streams, and at the toe of slopes perpendicular to the roadway alignment. Ecopassage success improves with larger size, better lighting, shorter length, cover within the passage, and straightness. Larger size accommodates more and larger wildlife species and decreases potential predator exploitation (where predators lie in wait at entrances). Better lighting, shorter length, cover availability, and straightness appear to increase use by reducing wildlife reluctance to enter constrained spaces where they may be at risk of being trapped or ambushed. Upon discovering an ecopassage animals typically perform a risk assessment before entering. For many species, if the exit is visible, cover is available along the way, and the passage not too constraining and “trap-like”, they are more likely to risk a dash to the other side. For other species, typically semi-fossorial or burrowing species that are comfortable entering small tunnels (i.e. snakes, frogs, weasels), these factors are less important, but small size ecopassages also become more risky if predators learn to exploit them and capture animals as they emerge from small exits.

Lighting ecopassages is important for maximizing the vegetation that can be established for wildlife cover and erosion control. This can be accomplished by choosing placements where the shortest length is achieved, lighting shoulders and medians by large grates, and choosing bridge spans over culvert designs, which raise elevations and allow for more light to enter.

All ecopassages should include roadway barriers to discourage wildlife from crossing over the roadways and direct animals towards the ecopassage underpass. These walls, fences and landscaping can be designed in various ways suitable to the local conditions, and should extend from both sides of the ecopassage entrance to some natural landscape feature which serves as a natural wildlife movement feature, such as a wetland edge, rise in elevation, or edge of a development. The length and type of barrier is landscape and design specific, and local conditions should be evaluated by a wildlife biologist familiar with the local wildlife species and their habitat preferences and typical movement patterns. For aquatic species (fishes, turtles), in-stream barriers should be assessed in design, such that high flows and stream bed structures do not act as barriers. Backwater pools where small fishes can rest can be designed where flows become more rapid by constraining the stream channel size or increasing the slope.

Ecopassages at stream crossings should be designed to first accommodate the stream flow, and second provide a dry shoreline pathway at a higher elevation that has additional cover for wildlife. The dry shelf will attract a greater diversity of wildlife into the ecopassage, and can be designed to be occasionally inundated during flood events. In such cases, structure and vegetation should be designed to withstand expected flood flows. The pathways (in-stream and upland) must be free of barriers to movement, such as vertical steps or large rock beds that are difficult to traverse.

Dry ecopassages are recommended on the Sunset-to-County X and Pebble Creek West/Far West alternatives. Should the Sunset-to-County X alternative be pursued, in addition to ecopassages the stream crossing, dry ecopassages are recommended at the wetland edges as shown in Figure 3. This will improve habitat connectivity and genetic exchange for snakes, frogs, turtles and small mammals across the roadway. Roadway barriers should be installed along the new highway from County X to the Wisconsin Southern Railroad to keep wildlife off the roadway and direct it into the ecopassages.

Should the Pebble Creek West/Far West alternative be pursued, in addition to ecopassages at all stream crossings, two ecopassages are recommended between West Sunset Drive and Highway 59 to reduce fragmentation of the environmental corridor and maintain habitat connectivity (Figure 3). For the southern passage a span is recommended, with elevation sufficient to allow for deer passage through the spanned ravine. For the northern ecopassage a box culvert design is recommended, allowing for a minimum 3 foot clearance. Roadway barriers should be installed on both sides of the new highway from West Sunset Drive and Highway 59 to keep wildlife off the roadway and direct it into the ecopassages.

Example Ecopassages. For more examples and design criteria see Finch (2011) and Beckmann et al. (2010).



5.2 Habitat Avoidance

For habitat avoidance, the Golf Course East alternative is the preferred alternative, followed by Pebble Creek West/Far West, and least preferred is Sunset-to-County X. The Golf Course East alternative already avoids most habitat, but could avoid more habitat if it continued straight north from just south of Sunset Drive, instead of curving east then west and thereby cutting into the primary environmental corridor habitat south of Sunset Drive. Habitat avoidance on the Pebble Creek West/Far West and Sunset-to-County X alternatives has already been maximized to the extent practical by keeping these alternatives as far west as possible to minimize encroachment into the existing primary environmental corridor.

Habitat avoidance may have been confused with avoiding “take” (defined as killing individual animals) in Millmann (2005). These are not the same. In certain instances, life history features of certain species can be exploited so that habitat can be impacted without risk of direct animal mortality. An example is developing critical nesting habitat when birds are overwintering in South America, or developing upland nesting habitats when turtles are in wetland hibernating sites (and assuming that hatchlings do not overwinter at nesting areas). However, destroying habitat still kills animals, the effects are simply delayed to when the animals return to use the habitat and have no where to go. The ongoing declines in neotropical migrants underscore this reality. Therefore, “habitat avoidance”, as addressed here, means physically avoiding impacts to existing suitable habitat. If existing habitat is lost, it will reduce the population of the animals utilizing it unless it is replaced through mitigation. Therefore, the statement “*The best way to avoid affects to the snakes is to work during their dormant period, which is November 1 through March 15.*” is not entirely accurate – in such a scenario impacts to snakes would not be entirely avoided. Moreover, numerous instances of upland hibernating sites are now documented for Butler’s gartersnakes, so the assertion that certain habitats are only temporarily occupied in a predictable manner is tenuous and not recommended as a basis for regulatory decisions based on sound science. Wherever loss of suitable occupied Butler’s gartersnake habitat is proposed, an Incidental Take Authorization is recommended to recognize that mortality is likely to occur. The proper conservation response is to mitigate the mortality so that population viability is preserved. Under the Pebble Creek West/Far West and Sunset-to-County X alternatives suitable habitat for the two listed reptiles, and other species of conservation concern, will be impacted, so an Incidental Take Authorization is recommended for final design, which should address mitigation for habitat loss.

5.3 Exclusion Barriers

Prior to and during construction phases, snake and turtle removal surveys with exclusion barriers can be used to minimize movement into work areas, and move animals out of work areas, to reduce (but not entirely eliminate) mortality. This measure does not avoid “take” (mortality) because both turtles and snakes trespass (cross) fences to some degree, and it is almost impossible to catch and remove every individual. It does, however, significantly minimize “take”, and is a worthwhile mitigation measure. For this strategy to achieve value,

suitable habitat areas must be fenced off with trenched in silt fence before work begins, and sufficient time allowed for removal surveys to be conducted, typically by visual searches, trapping and cover object surveys to increase catch. Typically, fence barriers are installed in March, and removal surveys are conducted into early July, then fence barriers are maintained until construction ends. Barrier maintenance can be coordinated with the active seasons of the target species, with turtles and snakes inactive from approximately November 5 through March 15. During inactive periods animals cannot be successfully removed from work areas. Removal areas can be identified when limits of work are defined, and should include all suitable habitat areas to be impacted. The limits of work must include construction staging and access areas.

5.4 Habitat Management

A habitat restoration and management plan should be developed for the preferred alternative which addresses impacted habitat for all listed species and communities of conservation concern. This plan should include seeding and planting of graded areas to appropriate native plant communities (WisDOT should coordinate with WDNR on the appropriate seed mix to use on the highway side slopes), and have a minimum 5-year adaptive monitoring and management plan to ensure that intended plant communities are actually established and not compromised by invasive weeds. Typically, this involves annual weed control measures until native species are established.

For Blanding's turtle habitat management, careful attention should be given to the design of storm water basins, as these often attract turtles, and can be detrimental if turtles are thereby exposed to contaminated runoff. Storm water planning should consider stepped filtration systems, where contaminants are filtered in gravel beds without standing water (can be underground), then cleaner water is released to a vegetated basin suitable for turtle occupancy, before final release into the landscape, preferably through infiltration. In the Pebble Creek valley, care should be taken not to contaminate ground water in storm water filtration designs, as protected species utilize underground retreats flush with groundwater for portions of their life cycles (i.e. prairie crayfish, Blanding's turtle, Butler's gartersnake). Therefore, siting of facilities should take care to avoid sand or gravel lenses connected to groundwater flow.

For Butler's gartersnake habitat management, avoiding changes to hydrology where current high quality habitat supports both burrowing crayfish and snakes (i.e. the Pebble Creek valley) is important. Therefore, site grading analyses should take care to address sand or gravel lenses connected to groundwater flow. Habitat management should include removal of invasive woody shrubs to foster a diverse grass and forb layer.

5.5 Monitoring

The success of the project cannot be properly evaluated without comparing baseline pre-construction conditions with final post-construction conditions, which assessment depends

upon reliable monitoring data at both points. Existing baseline conditions should be well described before work begins, including plant and animal inventories (including in-stream fish and macroinvertebrate communities), and photo documentation. After construction ends, a 10-year monitoring plan is recommended to periodically sample restored plant and animal communities to ensure that target focal species are being maintained. These focal species should include both listed species and species of conservation concern (i.e. amphibians, reptiles, birds, mammals, crayfish, mussels, plants, etc.). For Butler's gartersnake, cover object surveys can identify active use areas, and mark-recapture studies are necessary to evaluate population level changes (McDiarmid et al. 2012).

Since work on the south end of the project is still some years out, and there is very little actual data on Blanding's turtles in the corridor, it would be very useful to collect data between 2012-2014 for final fine-tuning of the alignment and mitigation measures. Turtles can be captured by hoop net trapping and visual searches, and then radio telemetry with GPS logging used to identify high use areas, movement patterns and critical habitat areas such as nesting sites (McDiarmid et al. 2012). Radio telemetry studies can be accomplished more cheaply and thoroughly than in the past by using GPS logging devices to automate recording of movements, producing accurate maps of turtle movement patterns and pinpointing critical habitat areas such as nesting and overwintering sites. These data could then be used to improve planning for protections or enhancements when the south end of the project is finalized.

Similarly, there is ample time to perform additional biotic survey to confirm the identity of the suspected prairie crayfish (trapping is feasible in early 2013), and any of the other Special Concern species or Species of Greatest Conservation Need mentioned in Table 2, to determine if species are present or not. These data would then be very useful in finalizing plans.

Ecopassage use should also be monitored post-construction for success through various trapping methods (funnel traps, sand traps, camera traps).

5.6 Light and Noise Pollution

Light and noise pollution are emerging concerns as evidence mounts that both factors upset innate behaviors essential to successful animal life cycles, and can induce harmful stress in many animals, including humans (Jaeger and Hailman 1973, Baker 1990, Gerhardt and Huber 2002, Mazerolle et al. 2005, Longcore 2006, Baker and Richardson 2006). For example, birds and frogs may alter calling behaviors and timing, singing louder and during lull periods of human activity, to try to mitigate noise, and normally nocturnal animals alter behaviors in regions of perpetual light. Currently no feasible mechanism exists to control noise on roadways except for local ordinances (such as restricting and enforcing engine braking and decibel levels on motorcycles). Light pollution regulation is in its infancy, but can be addressed by following design recommendations such as those provide by the Dark Sky Society (<http://www.darksky.org/>).

5.7 Habitat Mitigation Opportunities

Opportunities for mitigation exist for all project alternatives. Habitat losses can be partially mitigated through habitat enhancements as follows.

- A. Habitat Enhancements. Removal of woody invasive shrubs in the Pebble Creek corridor between Hwy 59 and MacArthur Road is recommended to improve wildlife habitat conditions.
- B. Wetland Restoration. The highest value habitat loss mitigation opportunity available is the potential restoration of wetlands currently in agriculture between Sunset Drive and the Wisconsin-Southern Railroad. This wetland restoration should include both ephemeral wetlands which can support amphibians, and a deeper semi-permanent pond attractive to Blanding's turtles. This mitigation is recommended independent of any wetland loss mitigation, although it could potentially serve both purposes. It would be especially beneficial to Blanding's turtles and waterfowl, owing to a lack of existing deep pond habitat in this landscape.
- C. Removal and Restoration of Sunset Drive. Under the Pebble Creek West/Far West alternative, the new roadway will provide alternative traffic routes, and may afford an opportunity to restore the Pebble Creek Wetlands Natural Area by removing Sunset Drive where it bisects these wetlands. A removal design could include a trail on the old roadbed, providing sufficient breaks in the bed are achieved to restore hydrology. The removal of this barrier currently bisecting the Natural Area would be one of the most effective mitigation measures and should be given careful consideration.
- D. Sunset Drive Ecopassages. Under the Pebble Creek West/Far West alternative, if removal and restoration of Sunset Drive is not feasible, then the ecopassages recommended above (5.1.1) for Sunset Drive should still be considered for implementation as a mitigation measure for habitat loss.
- E. Habitat Management: Active management of the Pebble Creek Natural Area for maintaining and improving habitat quality would serve to some degree as an offset to the habitat acreage losses and increased movement barriers imposed by the Pebble Creek West/Far West or Sunset-to-County X alternatives. While habitat patch size and connectivity are important, habitat quality also affects species richness. If invasive species such as reed canary grass become dominant in the Pebble Creek Natural Area and corridor, its value as a natural area and as habitat supporting the species of conservation concern impacted by the highway project will be substantially reduced. Therefore, actively managing this complex would be a legitimate mitigation measure and is recommended. To achieve this, a management plan would need to be produced, initial funding provided (perhaps with an initial establishment budget, including writing the management plan, and an endowment for management in perpetuity), and a party or partners would need to become responsible for the management. Potential partners in a management plan could include the Retzer Nature Center, Waukesha County, the City of Waukesha, the WisDOT, and the Waukesha County Land Conservancy. Any of these entities could pursue additional

funding sources independent of the proposed highway project.

6. Incidental Take Authorization

As discussed above, appropriate documentation for an Incidental Take Authorization (ITA) should be prepared after a preferred alternative is chosen, and if consultations with WDNR conclude that an ITA is needed. Final design should allow for detailed mitigation measures to be developed where needed.

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8. Figures

- Figure 1: Study Area with Preliminary Alternatives
- Figure 2: Existing Butler's gartersnake habitat
- Figure 3: Recommended Ecopassages

9. Appendices

- Appendix A: Natural Heritage Inventory Results

Figure 1: Project Area

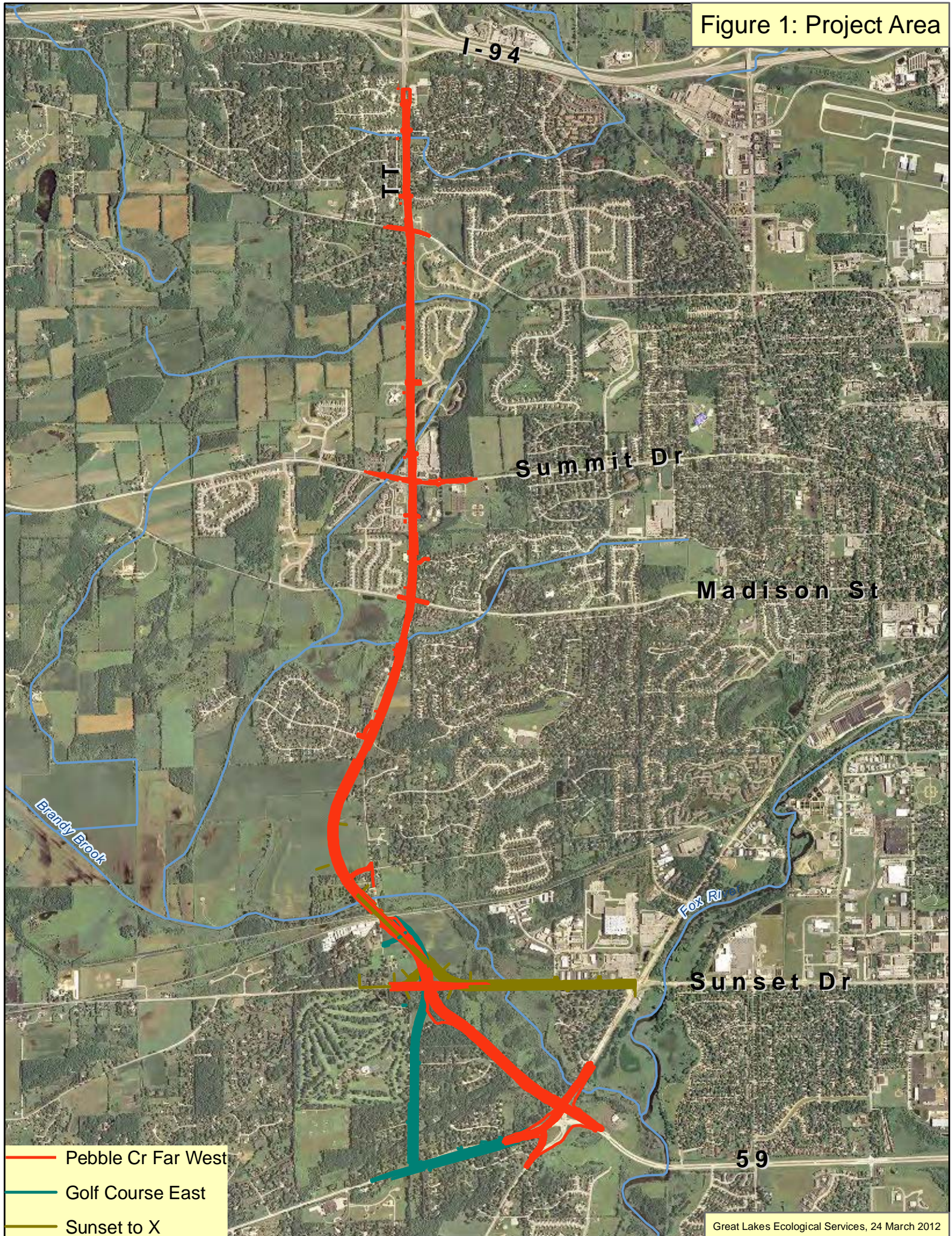


Figure 2: Butler's Gartersnake Habitat

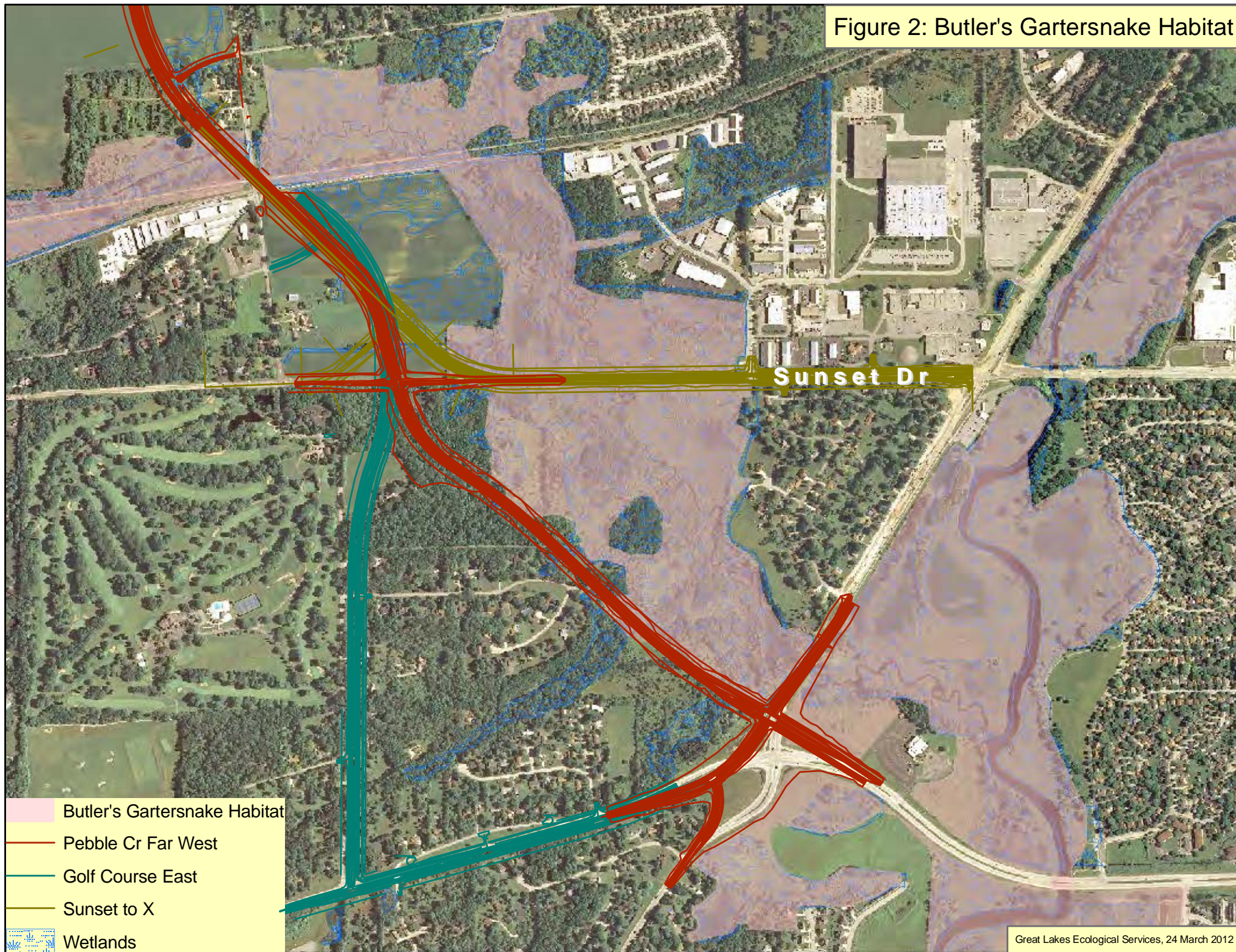
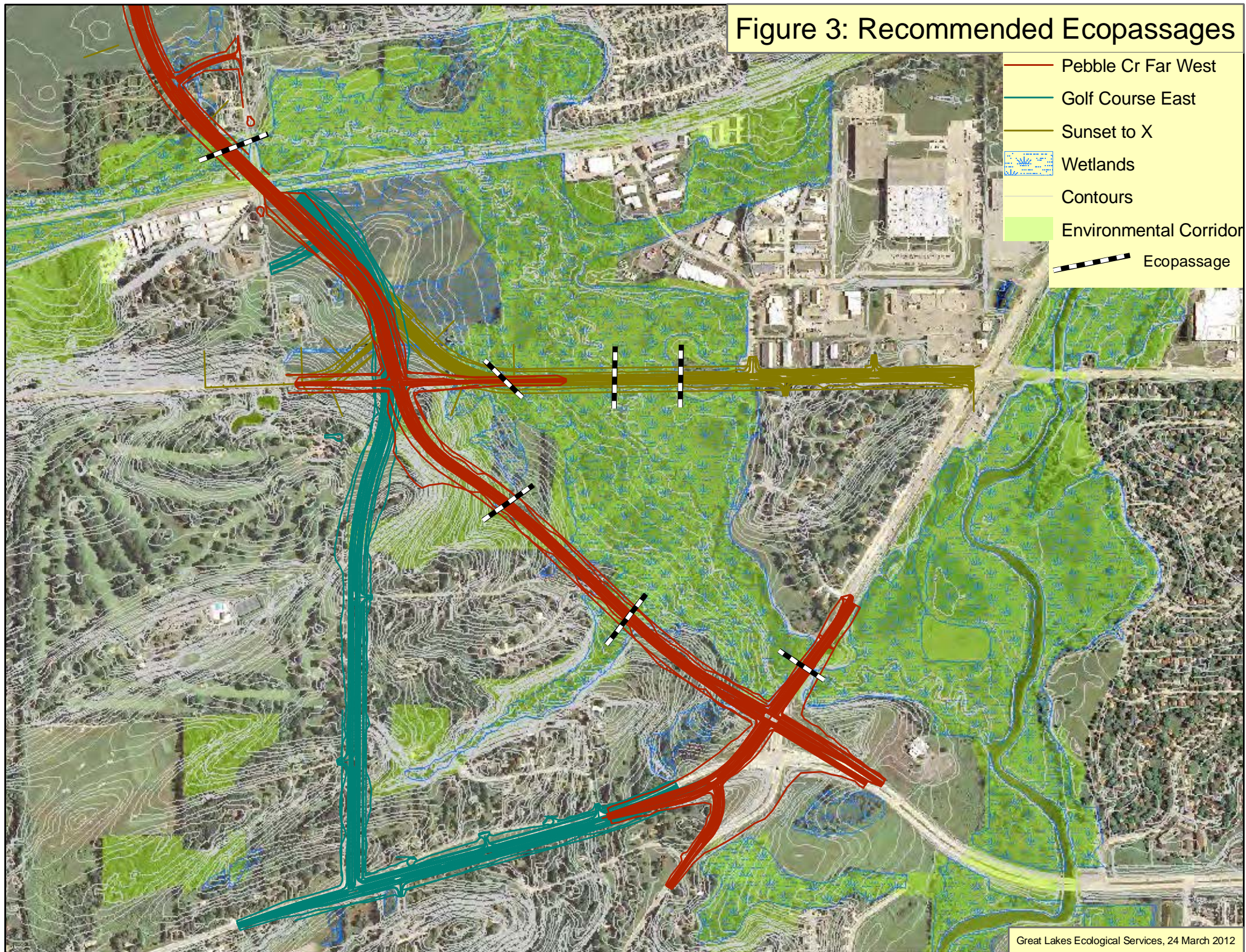


Figure 3: Recommended Ecopassages



Appendix A: Elements by Townrange for Waukesha County

The Natural Heritage Inventory (NHI) database contains recent and historic element (rare species and natural community) observations. A generalized version of the NHI database is provided below as a general reference and should not be used as a substitute for a WI Dept of Natural Resources NHI review of a specific project area. The NHI database is dynamic, records are continually being added and/or updated. The following data are current as of 11/04/2011:

Town Range

Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
<i>Asclepias lanuginosa</i>	Woolly Milkweed	THR		S1	G4?	Plant
<i>Asclepias purpurascens</i>	Purple Milkweed	END		S3	G5?	Plant
<i>Cirsium hillii</i>	Hill's Thistle	THR		S3	G3	Plant
<i>Gentiana alba</i>	Yellow Gentian	THR		S4	G4	Plant
<i>Polytaenia nuttallii</i>	Prairie Parsley	THR		S2	G5	Plant
<i>Stenelmis douglasensis</i>	Douglas Stenelmis Riffle Beetle	SC/N		S1S2	G1G3	Beetle~
<i>Tofieldia glutinosa</i>	Sticky False-asphodel	THR		S2S3	G4G5	Plant~
003N023E						
<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
004N015E						
<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
<i>Oporornis formosus</i>	Kentucky Warbler	THR		S1S2?B	G5	Bird
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
004N016E						
<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
<i>Oporornis formosus</i>	Kentucky Warbler	THR		S1S2?B	G5	Bird
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
004N017E						
<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Oak opening</i>	Oak Opening	NA		S1	G1	Community
<i>Shrub-carr</i>	Shrub-carr	NA		S4	G5	Community~
<i>Triglochin palustris</i>	Slender Bog Arrow-grass	SC		S3	G5	Plant~
004N018E						
<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
004N019E						
<i>Lepomis megalotis</i>	Longear Sunfish	THR		S2	G5	Fish~
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
004N020E						
<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
004N021E						
<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~

Town Range	Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
004N022E	<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
004N023E	<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
005N016E	<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
	<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
	<i>Oporornis formosus</i>	Kentucky Warbler	THR		S1S2?B	G5	Bird
	<i>Thamnophis proximus</i>	Western Ribbonsnake	END		S1	G5	Snake~
	<i>Wet-mesic prairie</i>	Wet-mesic Prairie	NA		S2	G2	Community~
	<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
005N017E	<i>Acris crepitans</i>	Northern Cricket Frog	END		S1	G5	Frog~
	<i>Aflexia rubranura</i>	Red-tailed Prairie Leafhopper	END		S2?	G2	Leafhopper
	<i>Agalinis auriculata</i>	Earleaf Foxglove	SC		S1	G3	Plant
	<i>Agrimonia parviflora</i>	Swamp Agrimony	SC		S1S2	G5	Plant~
	<i>Ammodramus henslowii</i>	Henslow's Sparrow	THR		S2S3B	G4	Bird
	<i>Asclepias purpurascens</i>	Purple Milkweed	END		S3	G5?	Plant
	<i>Asclepias sullivantii</i>	Prairie Milkweed	THR		S2S3	G5	Plant
	<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant
	<i>Bartramia longicauda</i>	Upland Sandpiper	SC/M		S2B	G5	Bird
	<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
	<i>Buteo lineatus</i>	Red-shouldered Hawk	THR		S3S4B,S1N	G5	Bird~
	<i>Cacalia tuberosa</i>	Prairie Indian-Plantain	THR		S3	G4G5	Plant
	<i>Calcareous fen</i>	Calcareous Fen	NA		S3	G3	Community~
	<i>Calephelis muticum</i>	Swamp Metalmark	END		S1	G3	Butterfly~
	<i>Carex sychnocephala</i>	Many-headed Sedge	SC		S2	G4	Plant~
	<i>Cedar glade</i>	Cedar Glade	NA		S4	GNR	Community
	<i>Chlidonias niger</i>	Black Tern	SC/M		S2B	G4	Bird~
	<i>Copelatus chevrolati</i>	A Predaceous Diving Beetle	SC/N		S1S2	GNR	Beetle~
	<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
	<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
	<i>Eleocharis compressa</i>	Flat-stemmed Spike-rush	SC		S2	G4	Plant~
	<i>Eleocharis flavescens var. olivacea</i>	Capitate Spike-rush	SC		S2	G5	Plant~
	<i>Eleocharis rostellata</i>	Beaked Spike-rush	THR		S2	G5	Plant~
	<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
	<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
	<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
	<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
	<i>Erynnis lucilius</i>	Columbine Dusky Wing	SC/N		S2S3	G4	Butterfly
	<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
	<i>Flexamia prairiana</i>	A Leafhopper	SC/N		S1	GNR	Leafhopper
	<i>Gentiana alba</i>	Yellow Gentian	THR		S4	G4	Plant
	<i>Hemileuca nevadensis ssp. 3</i>	Midwestern Fen Buckmoth	SC/N		S3	G5T3T4	Moth~
	<i>Icteria virens</i>	Yellow-breasted Chat	SC/M		S2B	G5	Bird
	<i>Liatris spicata</i>	Marsh Blazing Star	SC		S3	G5	Plant~
	<i>Lithobates palustris</i>	Pickerel Frog	SC/H		S3?	G5	Frog~

Town Range						
Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
<i>Memnonia panzeri</i>	A Leafhopper	SC/N		S2S3	GNR	Leafhopper
<i>Mesic prairie</i>	Mesic Prairie	NA		S1	G2	Community
<i>Oak opening</i>	Oak Opening	NA		S1	G1	Community
<i>Oak woodland</i>	Oak Woodland	NA		S1?	GNR	Community
<i>Oarisma powesheik</i>	Powesheik Skipperling	END	C	S1	G2G3	Butterfly~
<i>Papaipema beeriana</i>	Liatris Borer Moth	SC/N		S2S3	G2G3	Moth~
<i>Papaipema silphii</i>	Silphium Borer Moth	END		S2S3	G3G4	Moth~
<i>Platanthera leucophaea</i>	Prairie White-fringed Orchid	END	LT	S2	G2G3	Plant~
<i>Podiceps grisegena</i>	Red-necked Grebe	END		S1B	G5	Bird~
<i>Polystichum acrostichoides</i>	Christmas Fern	SC		S2	G5	Plant
<i>Polytaenia nuttallii</i>	Prairie Parsley	THR		S2	G5	Plant
<i>Prenanthes aspera</i>	Rough Rattlesnake-root	END		S1	G4?	Plant
<i>Rallus elegans</i>	King Rail	SC/M		S1B	G4	Bird~
<i>Regina septemvittata</i>	Queensnake	END		S1	G5	Snake~
<i>Sand prairie</i>	Sand Prairie	NA		S2	GNR	Community
<i>Scleria triglomerata</i>	Whip Nutrush	SC		S2S3	G5	Plant~
<i>Scleria verticillata</i>	Low Nutrush	SC		S2	G5	Plant~
<i>Shrub-carr</i>	Shrub-carr	NA		S4	G5	Community~
<i>Southern dry forest</i>	Southern Dry Forest	NA		S3	G4	Community
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Southern sedge meadow</i>	Southern Sedge Meadow	NA		S3	G4?	Community~
<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	SC/N		S2	G5	Mammal
<i>Thamnophis proximus</i>	Western Ribbonsnake	END		S1	G5	Snake~
<i>Tofieldia glutinosa</i>	Sticky False-asphodel	THR		S2S3	G4G5	Plant~
<i>Triglochin palustris</i>	Slender Bog Arrow-grass	SC		S3	G5	Plant~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
<i>Vireo bellii</i>	Bell's Vireo	THR		S2B	G5	Bird
<i>Wet-mesic prairie</i>	Wet-mesic Prairie	NA		S2	G2	Community~
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
<i>Zigadenus elegans var. glaucus</i>	White Camas	SC		S2S3	G5T4T5	Plant
005N018E						
<i>Alasmidonta marginata</i>	Elktoe	SC/P		S3	G4	Mussel~
<i>Alasmidonta viridis</i>	Slippershell Mussel	THR		S2	G4G5	Mussel~
<i>Asclepias purpurascens</i>	Purple Milkweed	END		S3	G5?	Plant
<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Cacalia tuberosa</i>	Prairie Indian-Plantain	THR		S3	G4G5	Plant
<i>Calcareous fen</i>	Calcareous Fen	NA		S3	G3	Community~
<i>Chlidonias niger</i>	Black Tern	SC/M		S2B	G4	Bird~
<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
<i>Eleocharis rostellata</i>	Beaked Spike-rush	THR		S2	G5	Plant~
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Enallagma basidens</i>	Double-striped Bluet	SC/N		S2?	G5	Dragonfly~
<i>Epilobium strictum</i>	Downy Willow-herb	SC		S2S3	G5?	Plant~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Fundulus dispar</i>	Starhead Topminnow	END		S2	G4	Fish~
<i>Haliplus canadensis</i>	A Crawling Water Beetle	SC/N		S2?	GNR	Beetle~

Town Range		State	Federal	State	Global	Group
Scientific Name	Common Name	Status	Status	Rank	Rank	Name
<i>Ixobrychus exilis</i>	Least Bittern	SC/M		S2S3B	G5	Bird~
<i>Laccobius agilis</i>	A Water Scavenger Beetle	SC/N		S2S3	GNR	Beetle~
<i>Lepomis megalotis</i>	Longear Sunfish	THR		S2	G5	Fish~
<i>Liatris spicata</i>	Marsh Blazing Star	SC		S3	G5	Plant~
<i>Mesic prairie</i>	Mesic Prairie	NA		S1	G2	Community
<i>Moxostoma valenciennesi</i>	Greater Redhorse	THR		S3	G4	Fish~
<i>Notropis anogenus</i>	Pugnose Shiner	THR		S2	G3	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	SC/N		S3	G5	Fish~
<i>Scleria verticillata</i>	Low Nutrush	SC		S2	G5	Plant~
<i>Southern sedge meadow</i>	Southern Sedge Meadow	NA		S3	G4?	Community~
<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	SC/N		S2	G5	Mammal
<i>Tamarack (rich) swamp</i>	Tamarack (Rich) Swamp	NA		S3	G3	Community~
<i>Thaspium trifoliatum var. flavum</i>	Purple Meadow-parsnip	SC		S2	G5T5	Plant
<i>Tofieldia glutinosa</i>	Sticky False-asphodel	THR		S2S3	G4G5	Plant~
<i>Triglochin palustris</i>	Slender Bog Arrow-grass	SC		S3	G5	Plant~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
<i>Villosa iris</i>	Rainbow Shell	END		S1	G5Q	Mussel~
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	SC/M		S3	G5	Bird
005N019E						
<i>Agrimonia parviflora</i>	Swamp Agrimony	SC		S1S2	G5	Plant~
<i>Alasmidonta marginata</i>	Elktoe	SC/P		S3	G4	Mussel~
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Carex gracilescens</i>	Slender Sedge	SC		SH	G5?	Plant
<i>Chlidonias niger</i>	Black Tern	SC/M		S2B	G4	Bird~
<i>Conioselinum chinense</i>	Hemlock Parsley	END		SX	G5	Plant~
<i>Deschampsia cespitosa</i>	Tufted Hairgrass	SC		S3	G5	Plant~
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Floodplain forest</i>	Floodplain Forest	NA		S3	G3?	Community~
<i>Fraxinus quadrangulata</i>	Blue Ash	THR		S1	G5	Plant
<i>Fundulus dispar</i>	Starhead Topminnow	END		S2	G4	Fish~
<i>Gymnocladus dioicus</i>	Kentucky Coffee-tree	SC		S2	G5	Plant
<i>Ixobrychus exilis</i>	Least Bittern	SC/M		S2S3B	G5	Bird~
<i>Jeffersonia diphylla</i>	Twinleaf	SC		S3	G5	Plant
<i>Lepomis megalotis</i>	Longear Sunfish	THR		S2	G5	Fish~
<i>Notropis anogenus</i>	Pugnose Shiner	THR		S2	G3	Fish~
<i>Oecetis nocturna</i>	A Long-horned Casemaker Caddisfly	SC/N		S1S3	G5	Caddisfly~
<i>Ptelea trifoliata</i>	Wafer-ash	SC		S2	G5	Plant
<i>Southern dry forest</i>	Southern Dry Forest	NA		S3	G4	Community
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Southern hardwood swamp</i>	Southern Hardwood Swamp	NA		S2	G4?	Community~
<i>Southern mesic forest</i>	Southern Mesic Forest	NA		S3	G3?	Community
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
<i>Tofieldia glutinosa</i>	Sticky False-asphodel	THR		S2S3	G4G5	Plant~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	SC/M		S3	G5	Bird

Town Range	Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
005N020E	<i>Asclepias purpurascens</i>	Purple Milkweed	END		S3	G5?	Plant
	<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant
	<i>Aythya americana</i>	Redhead	SC/M		S2B	G5	Bird~
	<i>Carex crus-corvi</i>	Ravenfoot Sedge	END		S1	G5	Plant~
	<i>Chlidonias niger</i>	Black Tern	SC/M		S2B	G4	Bird~
	<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
	<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
	<i>Floodplain forest</i>	Floodplain Forest	NA		S3	G3?	Community~
	<i>Fraxinus quadrangulata</i>	Blue Ash	THR		S1	G5	Plant
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	SC/P		S4B,S4N	G5	Bird~
	<i>Ixobrychus exilis</i>	Least Bittern	SC/M		S2S3B	G5	Bird~
	<i>Mesic prairie</i>	Mesic Prairie	NA		S1	G2	Community
	<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
	<i>Sterna forsteri</i>	Forster's Tern	END		S1B	G5	Bird~
	<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	SC/M		S3	G5	Bird
005N021E	<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
005N022E	<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
006N015E	<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
006N016E	<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
	<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
006N017E	<i>Ammodramus henslowii</i>	Henslow's Sparrow	THR		S2S3B	G4	Bird
	<i>Argia plana</i>	Highland Dancer	SC/N		S2S3	G5	Dragonfly~
	<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant
	<i>Bartramia longicauda</i>	Upland Sandpiper	SC/M		S2B	G5	Bird
	<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
	<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
	<i>Buteo lineatus</i>	Red-shouldered Hawk	THR		S3S4B,S1N	G5	Bird~
	<i>Calcareous fen</i>	Calcareous Fen	NA		S3	G3	Community~
	<i>Carex sychnocephala</i>	Many-headed Sedge	SC		S2	G4	Plant~
	<i>Carex torreyi</i>	Torrey's Sedge	SC		S1	G4	Plant
	<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
	<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
	<i>Dichanthelium wilcoxianum</i>	Wilcox's Panic Grass	SC		S1	G5	Plant
	<i>Dry prairie</i>	Dry Prairie	NA		S3	G3	Community
	<i>Eleocharis quinqueflora</i>	Few-flowered Spike-rush	SC		S2	G5	Plant~
	<i>Eleocharis rostellata</i>	Beaked Spike-rush	THR		S2	G5	Plant~
	<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
	<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
	<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
	<i>Ephemeral pond</i>	Ephemeral Pond	NA		SU	GNRQ	Community~
	<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
	<i>Gentiana alba</i>	Yellow Gentian	THR		S4	G4	Plant

Town Range						
Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
<i>Helminthos vermivorus</i>	Worm-eating Warbler	END		S1B	G5	Bird~
<i>Hemileuca nevadensis ssp. 3</i>	Midwestern Fen Buckmoth	SC/N		S3	G5T3T4	Moth~
<i>Juncus marginatus</i>	Grassleaf Rush	SC		S2	G5	Plant~
<i>Lake--deep, hard, drainage</i>	Lake--Deep, Hard, Drainage	NA		S3	GNR	Community~
<i>Lithobates palustris</i>	Pickerel Frog	SC/H		S3?	G5	Frog~
<i>Notropis nubilus</i>	Ozark Minnow	THR		S2	G5	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Open bog</i>	Open Bog	NA		S4	G5	Community~
<i>Oporornis formosus</i>	Kentucky Warbler	THR		S1S2?B	G5	Bird
<i>Sand prairie</i>	Sand Prairie	NA		S2	GNR	Community
<i>Shrub-carr</i>	Shrub-carr	NA		S4	G5	Community~
<i>Southern dry forest</i>	Southern Dry Forest	NA		S3	G4	Community
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Triglochin palustris</i>	Slender Bog Arrow-grass	SC		S3	G5	Plant~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
006N018E						
<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Cacalia tuberosa</i>	Prairie Indian-Plantain	THR		S3	G4G5	Plant
<i>Calcareous fen</i>	Calcareous Fen	NA		S3	G3	Community~
<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
<i>Deschampsia cespitosa</i>	Tufted Hairgrass	SC		S3	G5	Plant~
<i>Dry-mesic prairie</i>	Dry-mesic Prairie	NA		S2	G3	Community
<i>Eleocharis rostellata</i>	Beaked Spike-rush	THR		S2	G5	Plant~
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Gentiana alba</i>	Yellow Gentian	THR		S4	G4	Plant
<i>Lepomis megalotis</i>	Longear Sunfish	THR		S2	G5	Fish~
<i>Liatris spicata</i>	Marsh Blazing Star	SC		S3	G5	Plant~
<i>Oak opening</i>	Oak Opening	NA		S1	G1	Community
<i>Papaipema beeriana</i>	Liatris Borer Moth	SC/N		S2S3	G2G3	Moth~
<i>Papaipema silphii</i>	Silphium Borer Moth	END		S2S3	G3G4	Moth~
<i>Penstemon hirsutus</i>	Hairy Beardtongue	SC		S1	G4	Plant
<i>Springs and spring runs, hard</i>	Springs and Spring Runs, Hard	NA		S4	GNR	Community~
<i>Stream--fast, hard, cold</i>	Stream--Fast, Hard, Cold	NA		S4	GNR	Community~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
<i>Thaspium trifoliatum var. flavum</i>	Purple Meadow-parsnip	SC		S2	G5T5	Plant
<i>Tofieldia glutinosa</i>	Sticky False-asphodel	THR		S2S3	G4G5	Plant~
<i>Valeriana sitchensis ssp. uliginosa</i>	Marsh Valerian	THR		S2	G4Q	Plant~
<i>Wet-mesic prairie</i>	Wet-mesic Prairie	NA		S2	G2	Community~
006N019E						
<i>Acris crepitans</i>	Northern Cricket Frog	END		S1	G5	Frog~
<i>Agrimonia parviflora</i>	Swamp Agrimony	SC		S1S2	G5	Plant~
<i>Alasmidonta marginata</i>	Elktoe	SC/P		S3	G4	Mussel~
<i>Alasmidonta viridis</i>	Slippershell Mussel	THR		S2	G4G5	Mussel~
<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant

Town Range		State	Federal	State	Global	Group
Scientific Name	Common Name	Status	Status	Rank	Rank	Name
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Calcareous fen</i>	Calcareous Fen	NA		S3	G3	Community~
<i>Calylophus serrulatus</i>	Yellow Evening Primrose	SC		S2	G5	Plant
<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Gentiana alba</i>	Yellow Gentian	THR		S4	G4	Plant
<i>Luxilus chrysocephalus</i>	Striped Shiner	END		S1	G5	Fish~
<i>Mesic prairie</i>	Mesic Prairie	NA		S1	G2	Community
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	SC/N		S3	G5	Fish~
<i>Prenanthes aspera</i>	Rough Rattlesnake-root	END		S1	G4?	Plant
<i>Ptelea trifoliata</i>	Wafer-ash	SC		S2	G5	Plant
<i>Southern dry forest</i>	Southern Dry Forest	NA		S3	G4	Community
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Southern mesic forest</i>	Southern Mesic Forest	NA		S3	G3?	Community
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
<i>Villosa iris</i>	Rainbow Shell	END		S1	G5Q	Mussel~
006N020E						
<i>Calamagrostis stricta</i>	Slim-stem Small Reed Grass	SC		S3	G5	Plant~
<i>Carex lupuliformis</i>	False Hop Sedge	END		S2	G4	Plant~
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
<i>Scutellaria ovata ssp. ovata</i>	Heart-leaved Skullcap	SC		S3	G5T5	Plant
<i>Thalictrum revolutum</i>	Waxleaf Meadowrue	SC		S2	G5	Plant~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
006N021E						
<i>Lythrurus umbratilis</i>	Redfin Shiner	THR		S2	G5	Fish~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
007N017E						
<i>Acris crepitans</i>	Northern Cricket Frog	END		S1	G5	Frog~
<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Bog relict</i>	Bog Relict	NA		S3	G3	Community~
<i>Diplazium pycnocarpon</i>	Glade Fern	SC		S2	G5	Plant
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Hardwood swamp</i>	Hardwood Swamp	NA		S3	G4	Community~
<i>Libellula incesta</i>	Slaty Skimmer	SC/N		S2S3	G5	Dragonfly~
<i>Moxostoma valenciennesi</i>	Greater Redhorse	THR		S3	G4	Fish~
<i>Notropis anogenus</i>	Pugnose Shiner	THR		S2	G3	Fish~
<i>Notropis nubilus</i>	Ozark Minnow	THR		S2	G5	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Simpsonaias ambigua</i>	Salamander Mussel	THR		S2	G3	Mussel~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
007N018E						

Town Range						
Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
<i>Acris crepitans</i>	Northern Cricket Frog	END		S1	G5	Frog~
<i>Aeshna clepsydra</i>	Mottled Darner	SC/N		S2S3	G4	Dragonfly~
<i>Besseyia bullii</i>	Kitten Tails	THR		S3	G3	Plant
<i>Calcareous fen</i>	Calcareous Fen	NA		S3	G3	Community~
<i>Calylophus serrulatus</i>	Yellow Evening Primrose	SC		S2	G5	Plant
<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
<i>Eleocharis rostellata</i>	Beaked Spike-rush	THR		S2	G5	Plant~
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR		S3S4	G4	Turtle~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Gentiana alba</i>	Yellow Gentian	THR		S4	G4	Plant
<i>Mesic prairie</i>	Mesic Prairie	NA		S1	G2	Community
<i>Notropis anogenus</i>	Pugnose Shiner	THR		S2	G3	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	SC/M		S2B	G5	Bird~
<i>Open bog</i>	Open Bog	NA		S4	G5	Community~
<i>Platanthera leucophaea</i>	Prairie White-fringed Orchid	END	LT	S2	G2G3	Plant~
<i>Shrub-carr</i>	Shrub-carr	NA		S4	G5	Community~
<i>Southern dry forest</i>	Southern Dry Forest	NA		S3	G4	Community
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
007N019E						
<i>Acris crepitans</i>	Northern Cricket Frog	END		S1	G5	Frog~
<i>Cypripedium candidum</i>	Small White Lady's-slipper	THR		S3	G4	Plant~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
007N020E						
<i>Ardea alba</i>	Great Egret	THR		S2B	G5	Bird~
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Carex crus-corvi</i>	Ravenfoot Sedge	END		S1	G5	Plant~
<i>Carex lupuliformis</i>	False Hop Sedge	END		S2	G4	Plant~
<i>Ixobrychus exilis</i>	Least Bittern	SC/M		S2S3B	G5	Bird~
<i>Platanthera leucophaea</i>	Prairie White-fringed Orchid	END	LT	S2	G2G3	Plant~
<i>Procambarus gracilis</i>	Prairie Crayfish	SC/N		S2?	G5	Crustacean~
<i>Scutellaria ovata ssp. ovata</i>	Heart-leaved Skullcap	SC		S3	G5T5	Plant
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Southern mesic forest</i>	Southern Mesic Forest	NA		S3	G3?	Community
<i>Southern sedge meadow</i>	Southern Sedge Meadow	NA		S3	G4?	Community~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
008N017E						
<i>Alasmidonta viridis</i>	Slippershell Mussel	THR		S2	G4G5	Mussel~
<i>Anguilla rostrata</i>	American Eel	SC/N		S2	G4	Fish~
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Notropis anogenus</i>	Pugnose Shiner	THR		S2	G3	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~

Town Range		State	Federal	State	Global	Group
Scientific Name	Common Name	Status	Status	Rank	Rank	Name
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	SC/M		S2B	G5	Bird~
<i>Simpsonia ambigua</i>	Salamander Mussel	THR		S2	G3	Mussel~
<i>Tamarack (rich) swamp</i>	Tamarack (Rich) Swamp	NA		S3	G3	Community~
<i>Venusta concha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
<i>Villosa iris</i>	Rainbow Shell	END		S1	G5Q	Mussel~
008N018E						
<i>Alasmodonta viridis</i>	Slippershell Mussel	THR		S2	G4G5	Mussel~
<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant
<i>Bird Rookery</i>	Bird Rookery	SC		SU	G5	Other~
<i>Buteo lineatus</i>	Red-shouldered Hawk	THR		S3S4B, S1N	G5	Bird~
<i>Dendroica cerulea</i>	Cerulean Warbler	THR		S2S3B	G4	Bird
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Haliaeetus leucocephalus</i>	Bald Eagle	SC/P		S4B, S4N	G5	Bird~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Penstemon hirsutus</i>	Hairy Beardtongue	SC		S1	G4	Plant
<i>Platanthera flava</i> var. <i>herbiola</i>	Pale Green Orchid	THR		S2	G4T4Q	Plant
<i>Platanthera hookeri</i>	Hooker's Orchid	SC		S2	G4	Plant
<i>Ptelea trifoliata</i>	Wafer-ash	SC		S2	G5	Plant
<i>Regina septemvittata</i>	Queensnake	END		S1	G5	Snake~
<i>Seiurus motacilla</i>	Louisiana Waterthrush	SC/M		S3B	G5	Bird~
<i>Southern dry-mesic forest</i>	Southern Dry-mesic Forest	NA		S3	G4	Community
<i>Tyto alba</i>	Barn Owl	END		SNA	G5	Bird
<i>Venusta concha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
<i>Wilsonia citrina</i>	Hooded Warbler	THR		S2S3B	G5	Bird
008N019E						
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Lycaena dione</i>	Gray Copper	SC/N		S2?	G5	Butterfly~
<i>Ptelea trifoliata</i>	Wafer-ash	SC		S2	G5	Plant
<i>Southern hardwood swamp</i>	Southern Hardwood Swamp	NA		S2	G4?	Community~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
008N020E						
<i>Alder thicket</i>	Alder Thicket	NA		S4	G4	Community~
<i>Archilestes grandis</i>	Great Spreadwing	SC/N		S2S3	G5	Dragonfly~
<i>Aster furcatus</i>	Forked Aster	THR		S3	G3	Plant
<i>Carex formosa</i>	Handsome Sedge	THR		S2	G4	Plant
<i>Carex lupuliformis</i>	False Hop Sedge	END		S2	G4	Plant~
<i>Emergent marsh</i>	Emergent Marsh	NA		S4	G4	Community~
<i>Erigenia bulbosa</i>	Harbinger-of-spring	END		S1	G5	Plant
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Floodplain forest</i>	Floodplain Forest	NA		S3	G3?	Community~
<i>Gymnocladus dioicus</i>	Kentucky Coffee-tree	SC		S2	G5	Plant
<i>Ixobrychus exilis</i>	Least Bittern	SC/M		S2S3B	G5	Bird~
<i>Jeffersonia diphylla</i>	Twinleaf	SC		S3	G5	Plant
<i>Procambarus gracilis</i>	Prairie Crayfish	SC/N		S2?	G5	Crustacean~
<i>Quercus muehlenbergii</i>	Chinquapin Oak	SC		S1S2	G5	Plant

Town Range						
Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	Group Name
<i>Shrub-carr</i>	Shrub-carr	NA		S4	G5	Community~
<i>Southern hardwood swamp</i>	Southern Hardwood Swamp	NA		S2	G4?	Community~
<i>Southern mesic forest</i>	Southern Mesic Forest	NA		S3	G3?	Community
<i>Southern sedge meadow</i>	Southern Sedge Meadow	NA		S3	G4?	Community~
<i>Tamarack (rich) swamp</i>	Tamarack (Rich) Swamp	NA		S3	G3	Community~
<i>Thamnophis butleri</i>	Butler's Gartersnake	THR		S3S4	G4	Snake~
<i>Trillium nivale</i>	Snow Trillium	THR		S3	G4	Plant
008N021E						
<i>Floodplain forest</i>	Floodplain Forest	NA		S3	G3?	Community~
<i>Southern mesic forest</i>	Southern Mesic Forest	NA		S3	G3?	Community
009N017E						
<i>Alasmidonta viridis</i>	Slippershell Mussel	THR		S2	G4G5	Mussel~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
009N018E						
<i>Empidonax virescens</i>	Acadian Flycatcher	THR		S3B	G5	Bird
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Regina septemvittata</i>	Queensnake	END		S1	G5	Snake~
<i>Venustaconcha ellipsiformis</i>	Ellipse	THR		S3	G4	Mussel~
009N019E						
<i>Erimyzon sucetta</i>	Lake Chubsucker	SC/N		S3	G5	Fish~
<i>Etheostoma microperca</i>	Least Darter	SC/N		S3	G5	Fish~
<i>Noturus exilis</i>	Slender Madtom	END		S1	G5	Fish~
<i>Regina septemvittata</i>	Queensnake	END		S1	G5	Snake~

This report lists locations for all elements occurring in Waukesha County, since many element occurrences cross county boundaries, it may also list townships from additional counties.



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October 5, 2011

Mr. Douglas Cain
Wisconsin Department of Transportation, Southeast Region
141 NW Barstow Street
Waukesha, WI 53187

Re: West Waukesha Bypass Road Safety Audit

Dear Mr. Cain:

Enclosed is the West Waukesha Bypass Road Safety Audit report. Please call with any questions.

Sincerely,

STRAND ASSOCIATES, INC.®

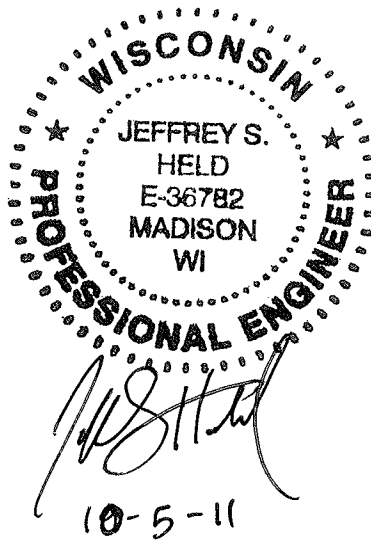
Jeffrey S. Held, P.E., PTOE

Enclosure: Report

c/enc: Gary Evans, Waukesha County Department of Public Works
Charlie Webb, CH2M Hill

Report for Wisconsin Department of Transportation

West Waukesha Bypass Road Safety Audit



Prepared by:

STRAND ASSOCIATES, INC.®
910 West Wingra Drive
Madison, WI 53715
www.strand.com

October 2011



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APPENDICES

APPENDIX A–SITE VISIT PHOTOLOG
APPENDIX B–CRASH RISK ASSESSMENT WORKSHOP
APPENDIX C–HISAFE INPUT AND OUTPUT

EXECUTIVE SUMMARY

This Road Safety Audit (RSA) includes observations from site visits to the West Waukesha Bypass (WWB) corridor, a one-day Crash Risk Assessment Workshop (CRAW), and analysis of the alternatives using the Highway Safety Manual (HSM) written by the American Association of State Highway and Transportation Organizations (AASHTO). The study corridor includes portions of County X, County D, and County TT from WIS 59 to Rolling Ridge Drive on the west side of the City of Waukesha, Wisconsin. The alternatives include a No-Build as well as 2-lane and 4-lane Build Alternatives.

The following observations were made during the site visit. The land use is predominantly residential except for a commercial land use hub located adjacent to the County TT and US 18 intersection. Vehicular traffic congestion and queuing were apparent during the site visit, particularly during peak travel times. Steady platoons of vehicles were observed along most of the corridor. Within the existing 2-lane section south of Madison Street, several roadway elements are likely deficient. The shoulders tend to be narrow, there are steep vertical curves and tight horizontal curves, the vision triangles at some access points appear inadequate, and fixed objects appear to exist within the roadway clear zone. Pedestrian and bicycle activity along the corridor was minimal except on the Glacial Drumlin State Trail. At the trail crossing long crossing delays experienced by trail users were observed. It should be noted that the primary site visit occurred after school was out for the summer.

The CRAW brought professionals together not directly involved in the project but familiar with the corridor. After an introduction to the corridor and the ongoing environmental documentation, the group discussed the purpose and goals of the workshop. The goals of the workshop included providing a review of the existing corridor and proposed alternatives followed by a qualitative discussion that resulted in a quantitative risk scoring of the No-Build and Build Alternatives. The risk scoring indicates the CRAW participants thought the No-Build and 2-Lane On-Alignment Alternatives have a higher risk of crashes than the higher Build Alternatives. The 2-lane and 4-lane Off-Alignment Alternatives scored similarly.

The final analysis used the Predictive Method outlined in the Highway Safety Manual (HSM). Throughout the corridor, the HSM predicts the No-Build Alternative has the highest crash rate. It also indicates that for each alignment option, the 4-lane alternatives will have lower crash rates than the 2-lane alternatives.

INTRODUCTION

Road Safety Audits (RSAs) are performed by an independent team of professionals to qualitatively identify crash trends, access and mobility needs, and potential improvements for existing or proposed roads and intersections. The goals are to effectively evaluate roadway deficiencies and reduce overall corridor lifecycle costs by reducing the number and severity of crashes, promoting awareness of standard design practices, integrating multimodal needs, and taking human factors into consideration during the design.

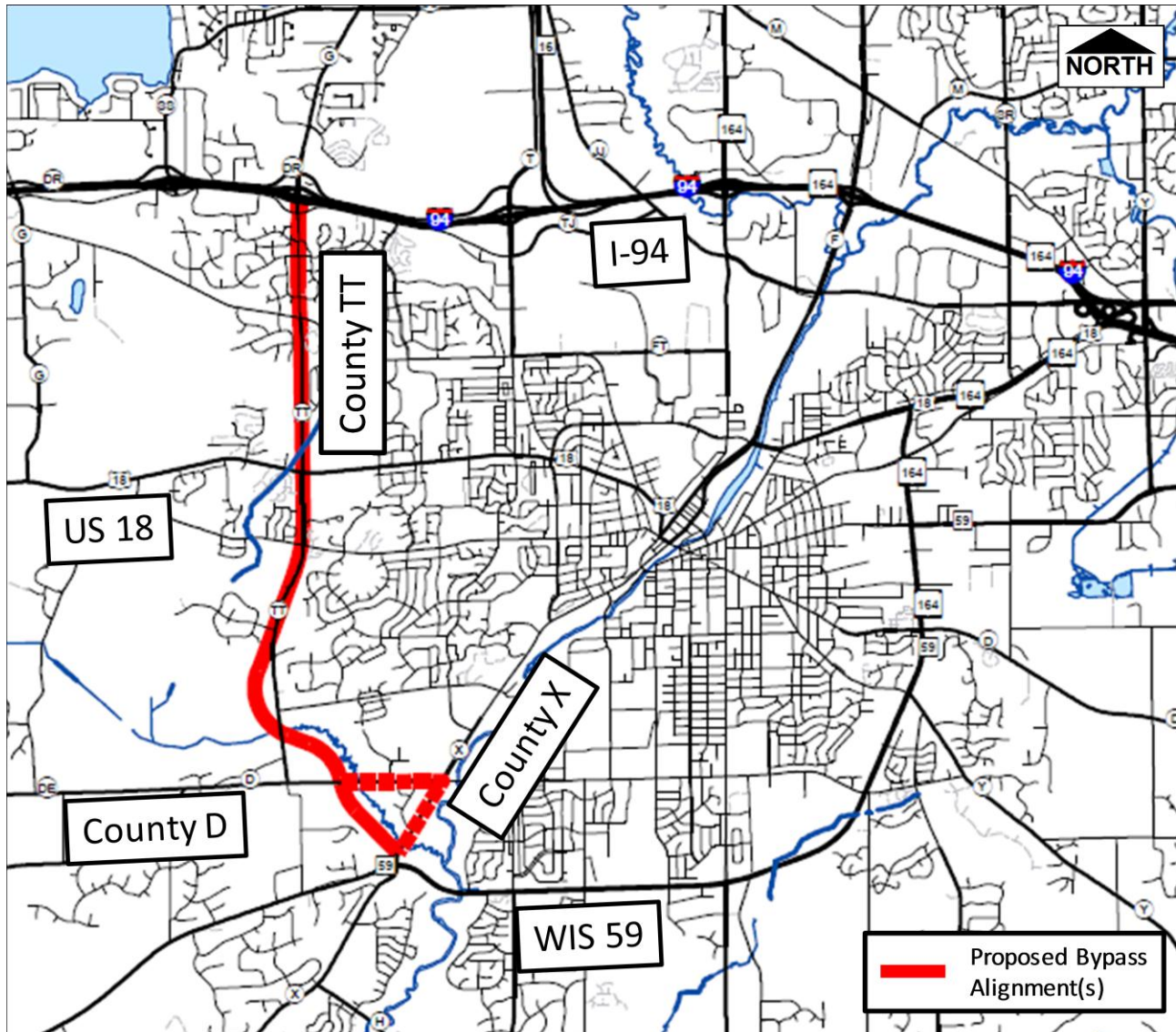
This RSA is intended to evaluate the improvement alternatives as well as the No-Build condition for the proposed West Waukesha Bypass (WWB) corridor. Each of the Build Alternatives should address crash trends, with improvements such as updating to current WisDOT and/or County design standards, relieving traffic congestion, and the addition/enhancement of pedestrian and bicycle facilities along and across the corridor.

The Federal Highway Administration (FHWA) has created guidelines for the preparation of RSAs. It is important to note that these guidelines specifically state that an RSA is not a method of rating one design option over another. This RSA, therefore, does not provide a recommendation to the design team regarding whether the No-Build or one of the improvement alternatives should be selected. Rather, this RSA independently evaluates each alternative on a planning level and includes the following items:

1. Brief summary of the site visit reviews.
2. Summary of the Crash Risk Assessment Workshop and findings.
3. Highway Safety Manual (HSM) Predictive Method output.

A. Study Corridor

At the request of the Wisconsin Department of Transportation (WisDOT), the following planning-level RSA was completed for the current project alternatives for the WWB in Waukesha County. A workshop was held to discuss planning-level design elements and a crash risk assessment exercise for the improvement alternatives. The Predictive Method, documented in the HSM written by AASHTO, was applied to the improvement alternatives including No-Build. The study corridor is located along County X, County D, and County TT from WIS 59 to Rolling Ridge Drive in central Waukesha County as shown in Figure 1.



Source – <http://www.tn.waukesha.wi.gov/docview.asp?docid=4955&locid=176>

Figure 1 Study Corridor Location

B. Background of the WWB

The study area is located on the west side of the City of Waukesha in Waukesha County. Planning for the bypass began in the early 1950s. According to the environmental document being prepared by Waukesha County and its consultant CH2M Hill, “the purpose of the West Waukesha Bypass is to provide a safe and efficient north-south arterial roadway on the west side of the City of Waukesha to complete the long-planned circumferential route around Waukesha; to accommodate growing traffic volumes along the corridor; and to improve roadway deficiencies that include tight curves, steep hills, narrow lanes, and lack of shoulders.”

The CH2M Hill document cites the following needs for the project:

1. *Project History* that dates to 1951 indicates increasing problems.
2. *Transportation and Land Use Planning* documents consistently recommend completion of the circumferential route.
3. *Traffic Demand* because of forecasted increases from about 20 to more than 50 percent in the next 25 years.
4. *Truck Traffic* on the existing route is about 6 to 8 percent.
5. *Highway Capacity* analysis indicates that portions of the existing facility will operate unacceptably in 2035. Some of the signalized intersections and nearly every stop-controlled side street or driveway will also fail if no changes are made.
6. *Safety* analysis indicates 4 out of 5 portions of the existing route had crash rates that exceeded statewide averages for similar facilities during the 3-year period of 2007 to 2009.
7. *Roadway Characteristics and Deficiencies* include the vertical alignment, stopping sight distance, intersection sight distance, and system linkage.

C. WWB Alternatives Evaluated

For the purposes of this RSA, the corridor was divided into three sections. The north section is from US 18 to Rolling Ridge Drive, the Center section is from the Wisconsin & Southern Railroad Tracks/Glacial Drumlin Trail (GDT) to US 18, and the south section is from County X/WIS 59 to the GDT. The following general corridor alternatives were considered and are summarized in Figure 2:

1. No-Build

This scenario makes no improvements to the County TT-County D-County X corridor between Rolling Ridge Drive and WIS 59 other than routine maintenance.

2. Reconstructed 2-lane on Existing TT Alignment (2ON)

This scenario reconstructs the 2-lane corridor on the existing alignment. It does not provide a grade separation of the GDT/Wisconsin & Southern railroad tracks north of County D. It would include addressing design deficiencies, changes in intersection control, and other features to reduce crashes.

3. Reconstructed 2-lane on TT2 using County D to County X (2-TT2-DX)

This scenario reconstructs the 2-lane corridor while also providing an off-alignment grade-separated crossing of the GDT/railroad tracks north of County D along the proposed TT2 alignment from the environmental document. It would connect to WIS 59 using County D and County X.

4. Reconstructed 2-lane on TT2 using Pebble Creek (West) Corridor (2-TT2-PC)

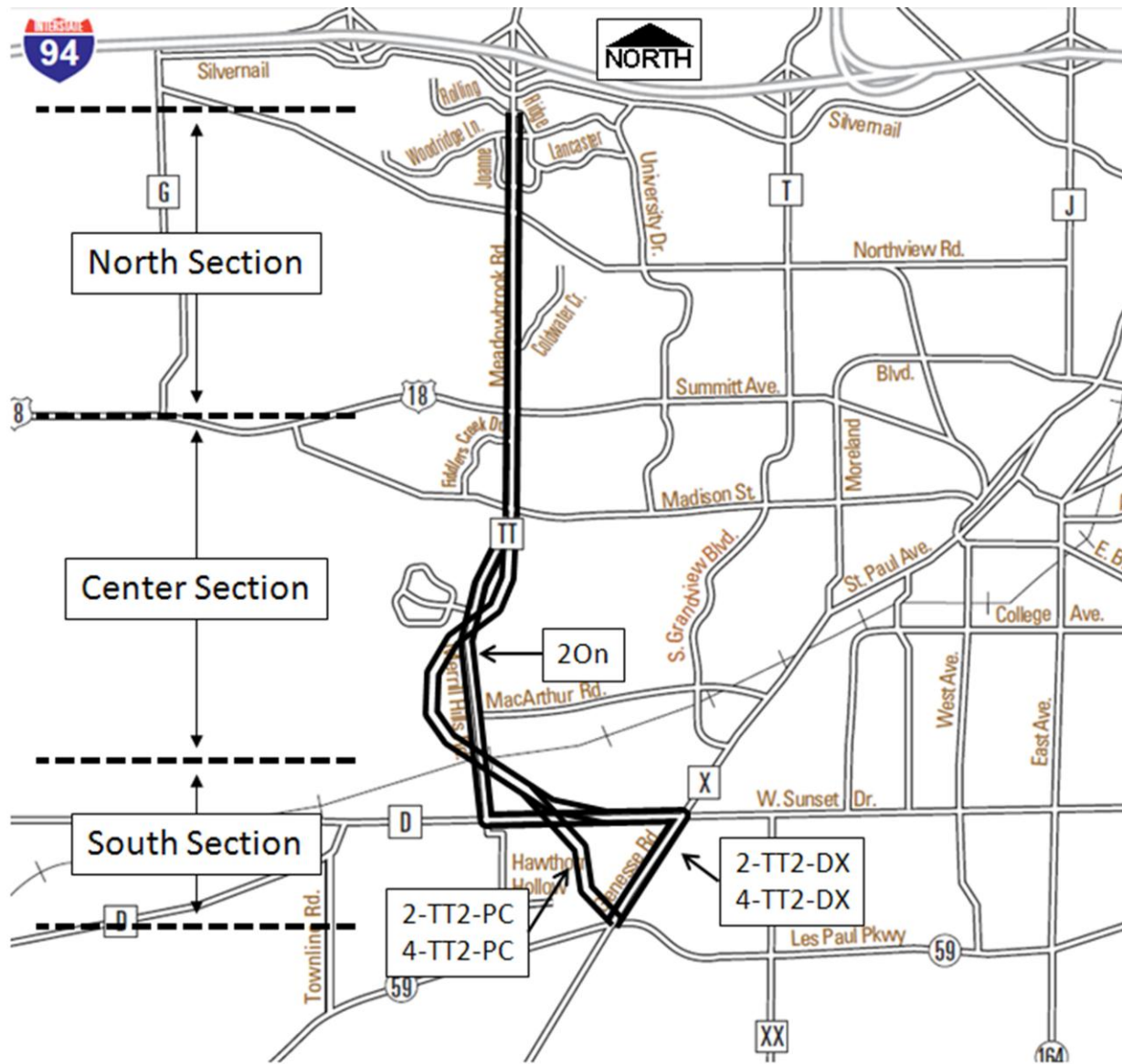
This scenario reconstructs the 2-lane corridor while also providing an off-alignment grade-separated crossing of the GDT/railroad tracks north of County D along the TT2 alignment. It would connect to WIS 59 using a new alignment west of Pebble Creek.

5. 4-lane on TT2 using County D to County X (4-TT2-DX)

This scenario constructs a 4-lane corridor including an off-alignment grade-separated crossing of the GDT/railroad tracks north of County D along the TT2 alignment. It would connect to WIS 59 using County D and County X.

6. 4-lane on TT2 using West Pebble Creek (West) Corridor (4-TT2-PC)

This scenario would construct a 4-lane corridor including an off-alignment grade-separated crossing of the GDT/railroad tracks north of County D along the TT2 alignment. It would connect to WIS 59 using a new alignment west of Pebble Creek.



Background Map: http://www.waukeshabypass.org/docs/Purpose_Need_for_Proposed_Action-v3.pdf

Figure 2 RSA Alternatives

The CRAW participants and study team for this RSA consisted of the following individuals:

1. Rebecca Szymkowski–WisDOT Statewide Traffic Safety Engineer (A.M. only)
2. Stacey Pierce–WisDOT Southeast Region
3. Eric Perea–WisDOT Southeast Region
4. Mike Grulke–Waukesha County Department of Public Works
5. Peter Chladil–Waukesha County Department of Public Works
6. Cheryl Shook–City of Waukesha
7. Charlotte Brunner–City of Waukesha
8. Steve Kraus–City of Waukesha Police Department
9. Lieutenant Bryan Ulm–Waukesha County Sheriff's Office
10. Jeff Held–Strand Associates, Inc.®
11. Cara Abts–Strand Associates, Inc.®
12. Matt Tronnes–Strand Associates, Inc.®
13. Joe Urban–Strand Associates, Inc.®

D. RSA Limitations

This RSA draws upon the collective expertise of the participants and uses information available at the time of the study. It is impossible to accurately predict a road or intersection's crash performance. Some of the findings in this report may be deemed prudent and feasible while others may not.

ROAD SAFETY AUDIT FINDINGS

A. Site Visits

Strand visited the site on the following dates during the following times:

1. April 25, 2011, from noon to 1 P.M.
2. June 6, 2011, from 1 to 2 P.M.
3. June 9, 2011, from 7 A.M. to 1 P.M. and from 2:30 to 4:30 P.M.

Figure 3 shows signs along the route for existing land uses. The land use is predominantly residential. A notable newer development is the Lodge apartment complex located southwest of the Coldwater Creek intersection, which includes four large multiunit buildings and appeared to be only partially occupied at the time of the site visits. The full impact of this development on traffic in the area is not yet known.

The area adjacent to the US 18 intersection is the largest commercial land use hub along the corridor including a gas station/convenience store, restaurant, shopping mall, office building, and other similar land uses. Agricultural/rural land uses also remain along existing County TT, specifically west of the corridor, indicating that the highway's role in local and regional travel will continue to evolve as the nearby land uses change.



Figure 3 Signs for Existing Land Uses

Vehicular traffic congestion and queuing were observed during the site visit during peak travel times. Steady platoons of vehicles were observed along most of the corridor. On June 9 at approximately 10 A.M., a delay of more than one minute (which represents Level of Service F) was observed for an eastbound through movement exiting the gas station/convenience market located northwest of the US 18 intersection. Figure 4 shows a northbound vehicle platoon passing this access point, located in the right foreground of the photo. Left turns and through movements from other side streets were also difficult to complete at times.



Figure 4 Northbound Vehicle Platoon on County TT

Within the existing 2-lane section south of Madison Street, several roadway elements are likely deficient. The shoulders tend to be narrow, there are steep vertical curves and tight horizontal curves, the vision triangles at some access points appear inadequate, and fixed objects appear to exist within the roadway clear zone. Figure 5 shows one of these fixed objects; in this case, a tree appears to have been struck in a previous crash.



Figure 5 A Roadside Fixed Object on County TT

The primary site visit on June 9, 2011, occurred just after school was out for the summer. Pedestrian and bicycle activity along the corridor was minimal, except on the Glacial Drumlin State Trail. Long crossing delays experienced by trail users were observed at the crossing. More than once, sufficient gaps from both directions of traffic did not occur until one or more vehicles yielded to the crossing pedestrians/bicyclists.

Photos taken during the site visit are included in Appendix A.

Audit Finding 1: If 4-TT2-DX or 4-TT2-PC alternative is selected, the section from Northview Road to Rolling Ridge Drive will be constructed within existing right of way. Most of the existing west sidewalk is located so that it can remain, and the additional travel lanes will be constructed between the west sidewalk and the existing travel lanes. Based on a site visit and stopping behind the existing west sidewalk, it appears that improvements to the existing vision corners for eastbound vehicles at Woodridge Lane and Joanne Drive may be necessary. Figure 6 shows the view for an eastbound vehicle at approximately the future stop bar location facing north at Joanne Drive.



Figure 6 Facing North at Joanne Drive

B. Crash Risk Assessment Workshop (CRAW)

The CRAW was conducted on June 23, 2011. The CRAW brought individuals together not directly involved in the project but familiar with the corridor. After an introduction to the corridor and the ongoing environmental documentation from Gary Evans, Engineering Services Director for the Waukesha County Department of Public Works, the CRAW participants discussed the purpose and goals of the workshop.

The goals of the CRAW included providing a review of the existing corridor and proposed alternatives, followed by a qualitative discussion that resulted in a quantitative scoring of the No-Build and Build Alternatives. The group reviewed the existing corridor and intersection crash history before discussing how it operates with respect to cars, trucks, bicycles, and pedestrians. Exhibits of each improvement alternative and the No-Build conditions were also reviewed.

Audit Finding 2: The group discussed the appropriate typical section for the WWB 4-lane alternatives knowing that the proposed typical section for most of the route would be similar to the existing bypass corridor along WIS 59 east of County X. This would include a raised center median, two travel lanes, a wide shoulder, and ditches for stormwater management on each side. This is a reasonable approach for many reasons, including maintaining route consistency and meeting driver expectations.

Based on WisDOT field data, the existing bypass has an 85th percentile speed of 55 miles per hour (mph) in one location, despite the posted speed limit of 45 mph. It is reasonable to expect that the proposed WWB corridor could experience similar speeds where the same rural-type typical section is used. Considering the proposed 45 mph posted speed in these sections, and the existing and anticipated residential land uses near the corridor, the design team could consider additional investigation of using a fully urban section, continuous street lighting, and/or other treatments to convey a more urban/suburban context with the goal of achieving 85th percentile speeds within 5 mph of the proposed 45 mph speed limit.

Audit Finding 3: The group discussed the strengths and weaknesses of a 2-lane versus a 4-lane corridor. The team assumed that if a 2-lane Build Alternative were selected, the intersections may ultimately need to be expanded to provide 4 through lanes to meet operations criteria. The result would be a corridor that frequently expands from 2 lanes to 4 lanes only to taper back to 2 lanes again. The frequent tapers and route inconsistency could increase the risk of crashes compared to a consistent 4 lane corridor, particularly for unfamiliar drivers.

1. Crash Risk Ranking Exercise Overview

A crash risk rating procedure, employed by other RSA studies performed for WisDOT, was used for this project. Tables 1, 2, and 3 show the components of the procedure.

Potential crash risks associated with one or more of the alternatives were discussed. Each risk was assigned a frequency and severity rating. The two taken together result in the crash risk rating shown in Table 1. Crash risks range from A (low frequency and severity anticipated) to F (high frequency and severity anticipated).

FREQUENCY RATING	SEVERITY RATING			
	Low	Moderate	High	Extreme
Frequent	C	D	E	F
Occasional	B	C	D	E
Infrequent	A	B	C	D
Rare	A	A	B	C

Table 1 Crash Risk Rating

ESTIMATED		EXPECTED CRASH FREQUENCY (Per Audit Item)	FREQUENCY RATING
EXPOSURE	PROBABILITY		
High	High	10 or more crashes per year	Frequent
Medium	High		
High	Medium	1 to 9 crashes per year	Occasional
Medium	Medium		
Low	High	Less than 1 crash per year, and more than 1 crash every 5 years	Infrequent
High	Low		
Low	Medium	Less than 1 crash every 5 years	Rare
Medium	Low		
Low	Low		

Table 2 Crash Frequency Rating

TYPICAL CRASHES EXPECTED (Per Audit Item)	EXPECTED CRASH SEVERITY	SEVERITY RATING
Crashes involving high speeds, heavy vehicles, pedestrians, or bicycles	Probable fatality or incapacitating injury	Extreme
Crashes involving medium to high speed, head-on, crossing, or run-off-road crashes	Moderate to severe injury	High
Crashes involving low to medium speeds, left-turn, and right-turn crashes	Minor to moderate injury	Moderate
Crashes involving low to medium speeds, rear-end, and sideswipe crashes	Property damage only or minor injury	Low

Table 3 Crash Severity Rating

The actual crash frequency and severity of the anticipated risks is difficult to forecast. It is more appropriate to consider the letter rankings A through F as a means to compare risks among the alternatives than as a prediction of actual long-term crash frequency and severity on the WWB if the risks cannot be mitigated.

The full list of risks and rankings is included in Appendix B. This list represents the risks the workshop participants identified and evaluated on June 23; additional risks do and will exist. A scoring system was used based on the Abbreviated Injury Scale (AIS) developed by the United States Department of Transportation. The AIS assigns monetary values to crashes based on severity. The scale in 2011 dollars follows.

0.	No Injury	\$3,300
1.	Minor	\$18,600
2.	Moderate	\$291,400
3.	Serious	\$651,000
4.	Severe	\$1,649,200
5.	Critical	\$3,676,600
6.	Fatal	\$6,200,000

We assigned the following points to the individual crash risk ratings.

Crash Risk A =	0+1/100,000	=	0.22
Crash Risk B =	2/100,000	=	2.91
Crash Risk C =	3/100,000	=	6.51
Crash Risk D =	4/100,000	=	16.50
Crash Risk E =	5/100,000	=	36.76
Crash Risk F =	6/100,000	=	62.00

Table 4 summarizes the results of the ranking exercise for the No-Build and each Build Alternative.

Alternative	Number of Risks Identified	Range of Risks	Total Score Based on Risks Identified
No-Build	26	A to E	256
2ON	27	A to E	157
2-TT2-DX	24	A to D	111
2-TT2-PC	23	A to D	105
4-TT2-DX	23	A to D	108
4-TT2-PC	22	A to D	101

Table 4 Crash Risk Scoring (Lower Score Preferred)

The risk scoring indicates the CRAW participants felt the No-Build and 2ON alternatives have a higher risk of crashes than the higher Build Alternatives. The 2-TT2-DX, 2-TT2-PC, 4-TT2-DX, and 4-TT2-PC alternatives all scored very similar.

The following discussion summarizes the crash risks for each of the alternatives considered. Any risks that ranked C, but would be mitigated by a higher Build Alternative, and all of the crash risks that were ranked D or E are discussed. None of the risks were ranked F by the CRAW participants.

2. No-Build Crash Risk Rankings

Several crash risks cited by CRAW participants would not be mitigated by the No-Build Alternative. Most of these risks exist today but may be exacerbated if future traffic volumes grow. The risks that the group felt are of the highest concern include the following:

a. Substandard Vertical Profile (Risk Rating E)

The existing facility includes several substandard vertical curves that exceed recommended longitudinal grade values and/or do not provide adequate sight distance. These deficiencies increase the risk of crashes, particularly rear-end crashes when traffic slows or stops unexpectedly.

Audit Finding 4: If the No-Build Alternative is chosen as the preferred alternative for the corridor, the vertical profile will not be improved. Alternative funding sources such as Highway Safety Improvement Program (HSIP) funds could be investigated to use as a means to mitigate the highest priority locations based on crash history.

b. Intersection Crashes at the County TT and County D Intersection (Risk Rating E)

This existing signalized intersection was cited by the CRAW participants as an area that may benefit from improvement, and the crash data from the environmental document indicates it has the highest crash rate of the intersections studied in detail. Of the 27 crashes that occurred from 2007 to 2009, more than one half involved injuries.

Audit Finding 5: If the No-Build Alternative is chosen as the preferred alternative for the corridor, the intersection of County TT and County D will not be improved. Alternative funding sources could be investigated for mitigating the intersection crashes.

c. Deficient Shoulders (Risk Rating D)

The existing facility includes substandard shoulder widths, particularly south of the Madison Street intersection. Narrow shoulders can increase the risk of run-off-the-road crashes and increase the potential for secondary crashes to occur during incident mitigation.

Audit Finding 6: If the No-Build Alternative is chosen as the preferred alternative for the corridor, the deficient shoulders will not be improved. Alternative funding sources could be investigated to use for mitigating the highest priority locations based on crash history.

d. Roadside Hazards Such as Fixed Objects Within the Clear Zone (Risk Rating D)

The existing facility includes fixed objects within the clear zone, one of which is shown in Figure 4. Fixed objects and other roadside hazards can increase the possibility of injuries when crashes occur.

Audit Finding 7: If the No-Build Alternative is chosen as the preferred alternative for the corridor, the roadside hazards will not be mitigated. Alternative funding sources could be investigated to use for mitigating the highest priority objects based on crash history.

e. Left Turns Out of 2-Way Stop-controlled Intersections (Risk Rating D)

Left turns out from stop-controlled side streets are often the most problematic movement on a highway facility. The angle crashes involving high speed differentials that tend to occur at these locations can have high severity.

Audit Finding 8: If the No-Build Alternative is chosen as the preferred alternative for the corridor, the left turns out of 2-way stop-controlled intersections will not be altered.

Alternative funding sources could be investigated to use for mitigating the highest priority locations based on crash history.

f. Permitted-Only Left-Turn Signal Phasing at the US 18 Intersection
(Risk Rating D)

Some CRAW participants observed the signal phasing at the US 18 intersection should be changed from permitted-only to protected-permitted operation. This change could reduce angle crashes associated with left-turning traffic misjudging the gap in oncoming traffic.

Audit Finding 9: If the No-Build Alternative is chosen as the preferred alternative for the corridor, the phasing changes will not be investigated. Alternative funding sources could be investigated to use for evaluating the signal phasing.

g. Vision Triangle at MacArthur Road (Risk Rating D)

Vision for westbound vehicles at MacArthur Road is limited because of objects located within the vision triangles. This can make it difficult to identify the presence of cross traffic and increase the crash risk.

Audit Finding 10: If the No-Build Alternative is chosen as the preferred alternative, the vision triangles at MacArthur Road will not be improved. Alternative funding sources could be investigated to use for improving the vision triangles.

h. Pavement Condition of Southbound Lane South of Madison Street
(Risk Rating C)

South of Madison Street, the southbound lane on County TT was observed to be in poor condition. It is a maintenance issue for the County requiring frequent repaving as a result of settlement. The poor riding surface can increase the risk of run-off-the-road crashes.

Audit Finding 11: If the No-Build Alternative is chosen as the preferred alternative, the pavement condition will not be improved. Alternative funding sources could be investigated to use for improving the areas with the poorest pavement.

i. GDT At-Grade Crossing (Risk Rating C)

The CRAW participants discussed the at-grade crossing of the GDT. During heavy periods of traffic, sufficient crossing gaps from both directions of travel are rare. Long delays could increase the chance of unsafe crossing behavior. Also, if a driver stops to allow a trail user to cross, there could be an increased risk of rear-end crashes.

Audit Finding 12: If the No-Build Alternative is chosen as the preferred alternative, the GDT crossing will not be improved. Alternative funding sources could be investigated to use for improving the at-grade trail crossing.

j. Wisconsin & Southern Railroad Crossing (Risk Rating C)

An at-grade railroad crossing of the Wisconsin and Southern tracks exists near the GDT north of County D. CRAW participants agreed that crashes involving trains are rare but can be severe if they occur.

Audit Finding 13: If the No-Build Alternative is chosen as the preferred alternative, the railroad crossing will not be improved. Alternative funding sources could be investigated to use for improving the at-grade railroad crossing.

k. Additional Intersection Turns Associated with County D–County X Route (Risk Rating C)

The CRAW participants felt that the alternatives using County D and County X to connect to WIS 59 would have a higher risk of crashes because of the additional intersection turns required. Southbound vehicles would make a left turn at County D, a right turn at County X, and a left turn at WIS 59. Vehicles traveling the other direction would make a right-left-right combination of turns. The Pebble Creek alignment alternatives eliminate these three intersection turning movements.

Audit Finding 14: If the No-Build Alternative is chosen as the preferred alternative, the additional turning movements associated with traveling along the bypass route may increase the number of crashes compared to the Pebble Creek alignment alternatives. Alternative funding sources for mitigation measures such as protected-only turning movement signal phasing could be investigated.

l. Head-On Collisions with 2-Lane Alternatives (Risk Rating C)

The CRAW participants agreed that head-on collisions may be slightly more common on the 2-lane alternatives compared to the 4-lane divided highway alternatives.

Audit Finding 15: If the No-Build Alternative is chosen as the preferred alternative there may be a slightly higher risk of head-on collisions compared to the 4-lane alternatives. alternative funding sources for mitigation measures such as centerline rumble strips, enhanced markings and signage could be investigated.

3. 2ON Crash Risks

a. Intersection Crashes at County TT and County D (Risk Rating E)

This signalized intersection has the highest intersection crash rate for the entire corridor. Of 27 crashes that occurred at this intersection from 2007 to 2009, more than one half involved injuries.

Audit Finding 16: If the 2ON option is chosen as the preferred alternative for the corridor, the design team may consider adding enhanced safety measures to a

reconstructed signal or providing a roundabout at the County TT and County D intersection to address the high crash rate.

b. GDT (Risk Rating C)

The audit team discussed the at-grade crossing of the GDT. During heavy periods of traffic, sufficient crossing gaps from both directions of travel are rare. Long delays could increase the chance of unsafe crossing behavior. Also, if a driver stops to allow a trail user to cross, there could be an increased risk of rear-end crashes. The 2ON alternative does not grade separate the crossing.

Audit Finding 17: If the 2ON alternative is chosen as the preferred alternative improvements to the GDT at-grade crossing such as enhanced markings and signage, and construction of a center refuge area could be investigated.

c. Wisconsin & Southern Railroad Crossing (Risk Rating C)

An at-grade railroad crossing of the Wisconsin and Southern tracks exists near the GDT north of County D. CRAW participants agreed that crashes involving trains are rare but can be severe if they occur. The 2ON alternative does not improve the crossing.

Audit Finding 18: If the 2ON alternative is chosen as the preferred alternative, improvements to the at-grade railroad crossing such as advance beacons and enhanced signage and marking could be investigated.

d. Additional Intersection Turns Associated with County D–County X Route (Risk Rating C)

The CRAW participants felt the alternatives using County D and County X to connect to WIS 59 would have a higher risk of crashes because of the additional intersection turns required. Southbound vehicles would make a left turn at County D, a right turn at County X, and a left turn at WIS 59. Vehicles traveling the other direction would make a right-left-right combination of turns. The Pebble Creek alignment alternatives eliminate these three intersection turning movements.

Audit Finding 19: If the 2ON alternative is chosen as the preferred alternative, the additional turning movements associated with traveling along the bypass route may increase the number of crashes compared to the Pebble Creek alignment alternatives. Mitigation measures such as protected-only turning movement signal phasing could be investigated.

e. Head-On Collisions with 2-Lane Alternatives (Risk Rating C)

The CRAW participants agreed that head-on collisions may be slightly more common on the 2-lane alternatives compared to the 4-lane divided highway alternatives.

Audit Finding 20: If the 2ON alternative is chosen as the preferred alternative, there may be a slightly higher risk of head-on collisions compared to the 4-lane alternatives. Mitigation measures such as centerline rumble strips and enhanced markings and signage could be investigated.

4. 2-TT2-DX Crash Risks

a. Intersection Crashes at County TT and County D (Risk Rating D)

This signalized intersection has the highest intersection crash rate for the entire corridor. Of 27 crashes that occurred from 2007 to 2009, more than one half involved injuries.

Audit Finding 21: If the 2-TT2-DX option is chosen as the preferred alternative for the corridor, the design team may consider adding enhanced safety measures to a reconstructed signal or providing a roundabout at the County TT and County D intersection to address the high crash rate.

b. Additional Intersection Turns Associated with County D–County X Route (Risk Rating C)

The CRAW participants felt the alternatives using County D and County X to connect to WIS 59 would have a higher risk of crashes because of the additional intersection turns required. Southbound vehicles would make a left turn at County D, a right turn at County X, and a left turn at WIS 59. Vehicles traveling the other direction would make a right-left-right combination of turns. The Pebble Creek alignment alternatives eliminate these three intersection turning movements.

Audit Finding 22: If the 2-TT2-DX alternative is chosen as the preferred alternative, the additional turning movements associated with traveling along the bypass route may increase the number of crashes compared to the Pebble Creek alignment alternatives. Mitigation measures such as protected-only turning movement signal phasing could be investigated.

c. Head-On Collisions with 2-Lane Alternatives (Risk Rating C)

The CRAW participants agreed that head-on collisions may be slightly more common on the 2-lane alternatives compared to the 4-lane divided highway alternatives.

Audit Finding 23: If the 2-TT2-DX alternative is chosen as the preferred alternative, there may be a slightly higher risk of head-on collisions compared to the 4-lane alternatives. Mitigation measures such as centerline rumble strips, enhanced markings and signage, or others could be investigated.

5. 2-TT2-PC Crash Risks

a. Intersection Crashes at County TT and County D (Risk Rating D)

This signalized intersection has the highest intersection crash rate for the entire corridor. Of 27 crashes that occurred at this intersection from 2007 to 2009, more than one half involved injuries.

Audit Finding 24: If the 2-TT2-PC option is chosen as the preferred alternative for the corridor, the design team may consider adding an improved signal or providing a roundabout at the County TT and County D intersection to address the high crash rate.

b. Head-On Collisions with 2-Lane Alternatives (Risk Rating C)

The CRAW participants agreed that head-on collisions may be slightly more common on the 2-lane alternatives compared to the 4-lane divided highway alternatives.

Audit Finding 25: If the 2-TT2-DX alternative is chosen as the preferred alternative, there may be a slightly higher risk of head-on collisions compared to the 4-lane alternatives. Mitigation measures such as centerline rumble strips, enhanced markings and signage, or others could be investigated.

6. 4-TT2-DX Crash Risks

a. Left Turns Out of Stop-Controlled Side Street Intersections (Risk Rating D)

The CRAW participants discussed this potential crash risk and future conditions with 2035 traffic volumes and the different bypass alternatives in place. Based on higher traffic volumes with a 4-lane facility and increased conflict points, this was the only category where the CRAW participants' estimated Risk Rating is higher for a 4-lane divided facility than for an improved 2-lane facility.

Audit Finding 26: Left turns out from stop-controlled side streets are often the most problematic movement on a highway facility. If option 4-TT2-DX is the preferred alternative, the design team could evaluate prohibiting this movement from certain stop-controlled side streets and allowing downstream U-turns or other alternate means to complete a left-out movement. This could be particularly important at intersections where proximity to an adjacent signal or other concerns will preclude future signalization or roundabout control.

b. Intersection Crashes at County TT and County D (Risk Rating D)

This signalized intersection has the highest intersection crash rate for the entire corridor. Of 27 crashes that occurred at this intersection from 2007 to 2009, more than one half involved injuries.

Audit Finding 27: If the 4-TT2-DX option is chosen as the preferred alternative for the corridor, the design team may consider adding an improved signal or providing a roundabout at the County TT and County D intersection to address the high crash rate.

7. 4-TT2-PC Crash Risks

a. Left Turns Out of Stop-Controlled Side Street Intersections (Risk Rating D)

The CRAW participants spent considerable time discussing this potential crash risk and future conditions with 2035 traffic volumes and the different bypass alternatives in place. Based on higher traffic volumes with a 4-lane facility and increased conflict points, the study team felt this was the only category where the Risk Rating would be higher for a 4-lane divided facility than for a 2-lane facility.

Audit Finding 28: Left turns out from stop-controlled side streets are often the most problematic movement on a highway facility. If option 4-TT2-DX is the preferred alternative, the design team could evaluate prohibiting this movement from certain stop-controlled side streets and allowing downstream U-turns or other alternate means to complete a left-out movement. This could be particularly important at intersections where proximity to an adjacent signal or other concerns will preclude future signalization or roundabout control.

b. Intersection Crashes at County TT and County D (Risk Rating D)

This signalized intersection has the highest intersection crash rate for the entire corridor. Of 27 crashes that occurred at this intersection from 2007 to 2009, more than one half involved injuries.

Audit Finding 29: If the 4-TT2-PC option is chosen as the preferred alternative for the corridor, the design team may consider adding an improved reconstructed signal or providing a roundabout at the County TT and County D intersection to address the high crash rate.

D. HSM Predictive Method Results

According to the HSM 2010, "The Highway Safety Manual predictive method provides a quantitative measure of expected average crash frequency under both existing and future conditions. This allows proposed roadway conditions to be quantitatively assessed along with other considerations such as community needs, capacity, delay, cost, right-of-way, and environmental considerations."

For this study, Hi-Safe software was used to employ the Predictive Method procedures that are documented in the HSM. It is important to note that the HSM and Hi-Safe software are new tools, and as such, care should be taken in drawing conclusions based solely on the results. However, it is reasonable to begin using these new tools combined with more traditional analysis and decision-making tools to aid in the evaluation of alternatives.

The direct output from the Hi-Safe software is shown in Appendix C along with detailed input and output reports. The HSM methodology results in a total number of crashes based on the number of lanes, lane widths, shoulder widths, and the number of access points. The result also appears to be very dependent on the forecasted traffic volume under the different conditions. The WWB study contains travel demand modeling for many combinations of improvements. In other words, there is not just a single traffic forecast for the route. Rather, there are many scenarios depending on which alternatives are selected.

For this reason, corridor crash rates were calculated from the Hi-Safe predicted number of crashes. This allows for a relative comparison of the likelihood that crashes will occur with the different alternatives. Crash rates are typically used in crash studies because they allow for comparison of corridors that have different lengths and traffic volumes. Table 4 summarizes the crash frequency output from Hi-Safe converted to crash rates.

		On Existing Alignment					Off Existing Alignment					
Section	2035 Alternative	2035 Average Annual Weekday Traffic ^A	Length (mi)	Crash Rate (crashes/HMVT)			2035 Alternative	2035 Average Annual Weekday Traffic ^A	Length (mi)	Crash Rate (crashes/HMVT)		
				Injury and Fatal	Property Damage Only	Total				Injury and Fatal	Property Damage Only	Total
North	NB	18,670 ^B	1.66	74	146	220	---	---	---	---	---	---
	2ON 2-TT2-DX 2-TT2-PC			67	137	204	2DX 2-TT2-PC	22,660 ^C	1.66	71	142	213
	4-TT2-DX 4-TT2-PC			60	118	178	4-TT2-DX 4-TT2-PC	26,660 ^C		64	122	187
Center	NB	15,070 ^B	1.96	67	131	197	---	---	---	---	---	---
	2ON	51		104	155	---	---	---	---	---	---	
	2ON 2-TT2-DX	52		107	159	2-TT2-PC	17,160 ^C	2.10	40	88	128	
	---	---		---	---	4-TT2-PC	22,190 ^C		34	72	106	
South	NB	20,800 ^B	2.20	73	147	220	---	---	---	---	---	---
	2ON			71	143	214	2-TT2-DX	24,500 ^C	2.10	59	119	177
	---			---	---	---	4-TT2-DX	27,000 ^C	2.10	48	97	146
	---			---	---	---	2-TT2-PC	14,000 ^C	1.20	48	108	157
	---	---	---	---	---	---	4-TT2-PC	18,000 ^C	1.20	40	88	128

NOTE: Rates should not be directly compared to existing crash rates on the corridor, or statewide averages

- A Weighted AWDT used
- B No Build Volumes used
- C Build (with Bypass) Volumes used

Average Yearly Crash Rate = (# Crashes/# years*100,000,000)/(ADT*365*Length), Units = Crashes/Hundred Million Vehicle Miles Traveled (HM/MT)

Note: Crash Rate calculations Include Intersection Crashes

Table 5 HSM Predictive Method Equivalent Crash Rates (Updated September 2012)

The actual crash rates experienced on the corridor will vary from those predicted and may or may not be close to these values. It is also important to note that these crash rates should not be compared against existing crash rates or the statewide crash rates that WisDOT calculates each year. The rates in Table 5 converted from the Hi-Safe software include predicted crashes on each leg of the intersections, whereas the statewide rates typically are based on crashes along a specific route only (they do not include crashes on the side-street approaches at intersections along the subject route). Also, the actual number of crashes along a corridor is influenced by thousands of variables while the

HSM considers only a handful. So, direct comparison against existing or historic rates is also not appropriate. However, the HSM-based rates are a useful component for comparing the study alternatives amongst one another.

In each of the three sections, the HSM predicts that the No-Build Alternative has the highest crash rate as shown in Table 5. It also shows that for each alignment option, the 4-lane alternatives will have lower crash rates than the 2-lane alternatives.

RSA SUMMARY

The following observations were made during the site visit. The land use is predominantly residential except for a commercial land use hub located adjacent to the County TT and US 18 intersection. Vehicular traffic congestion and queuing was apparent during the site visit, particularly during peak travel times. Steady platoons of vehicles were observed along most of the corridor. Within the existing 2-lane section south of Madison Street several roadway elements are likely deficient. The shoulders tend to be narrow, there are steep vertical curves and tight horizontal curves, the vision triangles at some access points appear inadequate, and fixed objects exist within the roadway clear zone. Pedestrian and bicycle activity along the corridor was minimal except on the GDT. At the trail crossing long crossing delays experienced by trail users were observed.

The CRAW brought professionals together not directly involved in the project but familiar with the corridor. After an introduction to the corridor and the ongoing environmental documentation, the group discussed the purpose and goals of the workshop. The goals of the workshop included providing a review of the existing corridor and proposed alternatives followed by a qualitative discussion that resulted in a quantitative risk scoring of the No-Build and Build Alternatives. The risk scoring indicates the CRAW participants thought the No-Build and 2-Lane On-Alignment Alternatives have a higher risk of crashes than the higher Build Alternatives. The 2-Lane and 4-Lane Off-Alignment Alternatives scored similarly.

The final analysis used the Predictive Method outlined in the HSM. Throughout the corridor, the HSM predicts the No-Build Alternative will have the highest crash rate. It also indicates that for each alignment option, the 4-Lane Alternatives will have lower crash rates than the 2-Lane Alternatives.

APPENDIX A
SITE VISIT PHOTOLOG

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US 18 E



US 18 E



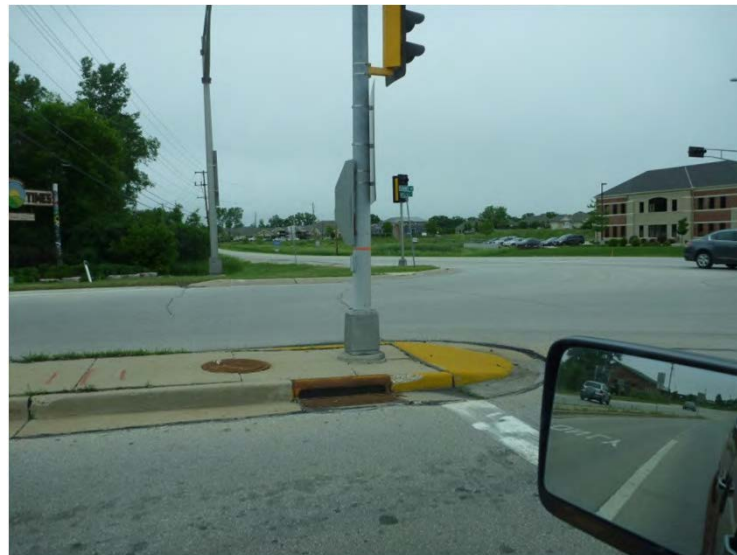
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PS (JS 2011) S

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US 18 W



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aukesha Bypass W

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aukesha Bypass W

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PS (JS 2011) -

West Waukesha Bypass - Design Road Safety Audit

Summary of Crash Risk Assessment Workshop Findings held June 23, 2011
July 6, 2011, Strand Associates, Inc.

CARS Existing Concerns	No Build (2NB)				2-Ln On-Alignment (2ON)				2-Ln Off-Alignment (2-TT2-DX)				2-Ln Off-Alignment (2-TT2-PC)				4-Ln County D to County X (4-TT2-DX)				4-Ln Pebble Creek (4-TT2-PC)			
	Freq	Sever	Risk	Score	Freq	Sever	Risk	Score	Freq	Sever	Risk	Score	Freq	Sever	Risk	Score	Freq	Sever	Risk	Score	Freq	Sever	Risk	Score
Poor shoulders (no shoulders in many locations)	OCC	HIGH	D	16.49	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22
Roadside hazards (objects in clear zones) are an issue	OCC	HIGH	D	16.49	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51
Left-turns out of driveways	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91
Left-turns out of two-way stop controlled intersections	OCC	HIGH	D	16.49	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	OCC	HIGH	D	16.49	OCC	HIGH	D	16.49
US 18 to I-94: Speed limits altered north and south of Northview - 35 mph north, 45 mph south. Design allows 55 mph. Carryover from north section to south.	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51
County TT & Rolling Ridge - heavy SB traffic. Has been mention of moving signal south to Woodridge.	INF	LOW	A	0.22	INF	LOW	A	0.22	INF	LOW	A	0.22	INF	LOW	A	0.22	INF	LOW	A	0.22	INF	LOW	A	0.22
Profile at Northview is a concern (assumes permanent signal installed, profile fixed)	INF	MOD	B	2.91	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22
County TT & Coldwater Intersection is a concern - particularly with additional growth anticipated. Warrants should be investigated.	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51
County TT & Gas Station/Sentry access will be a concern in the future - may need change in intersection control	OCC	MOD	C	6.51	OCC	MOD	C	6.51	OCC	MOD	C	6.51	OCC	MOD	C	6.51	OCC	MOD	C	6.51	OCC	MOD	C	6.51
US 18 & County TT signal - two phase signal results in a lot of delay for left turns. May warrant reinvestigation of protected left-turns	OCC	HIGH	D	16.49	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51	INF	HIGH	C	6.51
Substandard Vertical Profile (south of US 18)	FREQ	HIGH	E	36.76	INF	MOD	B	2.91	INF	MOD	B	2.91	INF	MOD	B	2.91	INF	MOD	B	2.91	INF	MOD	B	2.91
Pavement in Poor Shape: South of Madison, Pavement in southbound lanes is poor, repaved often due to constant settlement	INF	HIGH	C	6.51	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22
Christian Academy is major concern	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0
MacArthur Sight Distance	OCC	HIGH	D	16.49	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91
Glacier Drumlins Trail Crossing - drivers don't yield	RARE	EXT	C	6.51	RARE	EXT	C	6.51	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0
At-Grade Railroad Crossing	RARE	EXT	C	6.51	RARE	EXT	C	6.51	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0
Green Lane Sight Distance	INF	HIGH	C	6.51	RARE	HIGH	B	2.91	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22
County TT & County D - County would likely need to make improvements if bypass project falls through	FREQ	HIGH	E	36.76	FREQ	HIGH	E	36.76	OCC	HIGH	D	16.49	OCC	HIGH	D	16.49	OCC	HIGH	D	16.49	OCC	HIGH	D	16.49
Transit Garage on County D @ Badger - future bypass may require signal/RAB at that location.	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91
Left-Right-Left . . . Of County D to County X alternative may increase crash risks. SBL to WIS 59 is problematic.	OCC	MOD	C	6.51	OCC	MOD	C	6.51	OCC	MOD	C	6.51	-	-	-	0	OCC	MOD	C	6.51	-	-	-	0
Head-on collisions - risk associated with two-lane alternatives	INF	HIGH	C	6.51	OCC	HIGH	D	16.49	OCC	HIGH	D	16.49	OCC	HIGH	D	16.49	RARE	HIGH	B	2.91	RARE	HIGH	B	2.91
South of US 18, cross streets don't have sufficient radii to accommodate trucks	RARE	MOD	A	0.22	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0
Approach to County D/Sunset intersection (grade) is an issue for heavy vehicles. Also at Madison Street.	INF	MOD	B	2.91	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22
US 18 is truck route - but it's difficult for OS/OW loads to travel through downtown Waukesha. Future bypass would be heavily used.	-	-	-	0	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22	RARE	MOD	A	0.22
Significant problems at GDT crossing	RARE	EXT	C	6.51	RARE	EXT	C	6.51	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0
Probably not a lot of cyclists due to existing facility	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51
Driveway/street crossings of proposed multi-use path	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51
Residents feel it's safe for children crossing to elementary school at Rolling Ridge signal.	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51	RARE	EXT	C	6.51

SCORE	FNB	256	2ON	157	2DX	111	2PC	105	4DX	108	4PC	101
-------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Academy not on County TT with off-alignment option	
Off-alignment grade separates trail crossing and RR	
Green Lane no longer on mainline with off-alignment alternatives	
County TT & County D - improvements not shown for on-alignment, shown for off-alignment	
Risk associated with on-alignment route (through 3 intersections) vs. off-alignment which makes bypass the through route	

Note: Scoring assigns

A = 0.22
B = 2.91
C = 6.51
D = 16.49
E = 36.76
F = 62.00

West Waukesha Bypass Design Road Safety Audit

Car Concerns from Workshop Findings

July 6, 2011, Strand Associates, Inc.

CARS	No Build			2-Ln On-Alignment			2-Ln Off-Alignment			4-Ln On-Alignment			4-Ln Off-Alignment		
	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk
<u>Existing Concerns</u>															
Poor shoulders (no shoulders in many locations)	OCC	HIGH	D	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A
Roadside hazards (objects in clear zones) are an issue	OCC	HIGH	D	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C
Left-turns out of driveways	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B
Left-turns out of two-way stop controlled intersections	OCC	HIGH	D	RARE	HIGH	B	RARE	HIGH	B	OCC	HIGH	D	OCC	HIGH	D
US 18 to I-94: Speed limits altered north and south of Northview - 35 mph north, 45 mph south. Design allows 55 mph. Carryover from north section to south.	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C
County TT & Rolling Ridge - heavy SB traffic. Has been mention of moving signal south to Woodridge.	INF	LOW	A	INF	LOW	A	INF	LOW	A	INF	LOW	A	INF	LOW	A
Profile at Northview is a concern (assumes permanent signal installed, profile fixed)	INF	MOD	B	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A
County TT & Coldwater Intersection is a concern - particularly with additional growth anticipated. Warrants should be investigated.	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C
County TT & Gas Station/Sentry access will be a concern in the future - may need change in intersection control	OCC	MOD	C	OCC	MOD	C	OCC	MOD	C	OCC	MOD	C	OCC	MOD	C
US 18 & County TT signal - two phase signal results in a lot of delay for left turns. May warrant reinvestigation of protected left-turns	OCC	HIGH	D	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C
Substandard Vertical Profile (south of US 18)	FREQ	HIGH	E	INF	MOD	B	INF	MOD	B	INF	MOD	B	INF	MOD	B
Pavement in Poor Shape: South of Madison, Pavement in southbound lanes is poor, repaved often due to constant settlement	INF	HIGH	C	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A
Christian Academy area is a major concern	RARE	HIGH	B	RARE	HIGH	B	-	-		-	-		-	-	
MacArthur Sight Distance	OCC	HIGH	D	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B
Glacial Drumlin Trail Crossing - drivers don't yield	RARE	EXT	C	RARE	EXT	C	-	-		-	-		-	-	
At-Grade Railroad Crossing	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	-	-		-	-	
Green Lane Sight Distance	INF	HIGH	C	RARE	HIGH	B	RARE	HIGH	B	RARE	MOD	A	RARE	MOD	A
County TT & County D - County would likely need to make improvements if bypass project falls through	FREQ	HIGH	E	FREQ	HIGH	E	OCC	HIGH	D	OCC	HIGH	D	OCC	HIGH	D
Transit Garage on County D @ Badger - future bypass may require signal/RAB at that location.	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B	RARE	HIGH	B
Left-Right-Left . . . Of County D to County X alternative may increase crash risks. SBL to WIS 59 is problematic.	-	-		OCC	MOD	C	-	-		OCC	MOD	C	-	-	
<u>Future Concerns</u>															
Head-on collisions - risk associated with two-lane alternatives	INF	HIGH	C	INF	HIGH	C	INF	HIGH	C	RARE	HIGH	B	RARE	HIGH	B

Notes:

County TT & County D - improvements not shown for on-alignment, shown for off-alignment

Risk associated with on-alignment route (through 3 intersections) vs. off-alignment which makes bypass the through route

Academy not on County TT with off-alignment option

2-lane off-alignment grade separates trail crossing

Green Lane no longer on mainline with off-alignment alternatives

West Waukesha Bypass Design Road Safety Audit

Truck Concerns from Workshop Findings

July 6, 2011, Strand Associates, Inc.

TRUCKS	No Build			2-Ln On-Alignment			2-Ln Off-Alignment			4-Ln On-Alignment			4-Ln Off-Alignment		
	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk
<u>Existing Concerns</u>															
South of US 18, cross streets don't have sufficient radii to accommodate trucks	RARE	MOD	A	-	-		-	-		-	-		-	-	
Approach to County D/Sunset intersection (grade) is an issue for heavy vehicles. Also at Madison Street.	INF	MOD	B	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A
<u>Future Concerns</u>															
US 18 is truck route - but it's difficult for OS/OW loads to travel through downtown Waukesha. Future bypass would be heavily used.	-	-		RARE	MOD	A	RARE	MOD	A	RARE	MOD	A	RARE	MOD	A

Bicycle Concerns from Workshop Findings

BICYCLES	No Build			2-Ln On-Alignment			2-Ln Off-Alignment			4-Ln On-Alignment			4-Ln Off-Alignment		
	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk
<u>Existing Concerns</u>															
Significant problems at GDT crossing	RARE	EXT	C	RARE	EXT	C	-	-		-	-		-	-	
Probably not a lot of cyclists due to existing facility	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C
<u>Future Concerns</u>															
Driveway/street crossings of proposed multi-use path	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C

Two-lane off-alignment grade separates

Pedestrian Concerns from Workshop Findings

PEDESTRIANS	No Build			2-Ln On-Alignment			2-Ln Off-Alignment			4-Ln On-Alignment			4-Ln Off-Alignment		
	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk	Freq	Sever	Risk
<u>Existing Concerns</u>															
Residents feel it's unsafe for children crossing to elementary school at Rolling Ridge signal.	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C	RARE	EXT	C

West Waukesha Bypass - Design Road Safety Audit

Workshop Findings

July 6, 2011, Strand Associates, Inc.

CRASH RISK ASSESSMENT WORKSHOP FINDINGS (JUNE 23, 2011)

No Build

Considering future neighborhood/school/sports complex land uses, no build is less favorable for peds and bikes.

Vertical profile is a concern

Intersection crashes at County TT & County D need to be addressed

No shoulders along County TT south of Madison Street

Trees and other objects near roadway are a problem

Left-turns on to County TT are difficult

Left-turns at US 18 signal can be a problem

Sight distance from many side roads is inadequate

Existing pavement is in poor shape in some locations

The Glacial Drumlin Trail crossing is a concern

The railroad crossing is a problem

The indirect route following County D and County X to connect to WIS 59 may cause more intersection crashes

Two-Lane on-alignment/off-alignment

Should consider improving US 18 (east-west) at County TT

Will Badger be signalized?

Verify improvements at County D/County TT add sufficient capacity

Improve northview (permanent signal, profile, etc.)

Investigate warrants at Coldwater

Consider prohibiting left-out from Sentry/Gas Station, allowing u-turn at US 18 signal, accommodating u-turn at Coldwater (may require widening)

Minimize access points

Off-alignment provides better opportunity to limit direct access

Consider treatments needed for off-street multi-use path at driveways and intersections including special signage, blankout signs, etc.

Consistent bike/ped facilities

Ped/Bike crossings should include median refuge (mid-block, stop-control and signalized)

Pebble Creek alignment far west intersection with County D option - soften sharp curves or provide signage for curves approaching signal

Two-lane on-alignment - provide left-turn lanes on County D at Badger & adjacent intersection to avoid confusion over lane usage

Provide neutral or positive left-turn lanes

Improve proposed throat depth at Kame Terrace

Consider providing corridor & unsignalized intersection lighting

Consider high-visibility pedestrian crossing signs, etc., at Rolling Ridge

Four-Lane on-/off-alignment

Should consider improving US 18 (east-west) at County TT

Will Badger be signalized?

Investigate warrants at Coldwater

Consider prohibiting left-out from Sentry/Gas Station, allowing u-turn at US 18 signal, accommodating u-turn at Coldwater (may require widening)

Minimize access points

Consider prohibiting left-out from sidestreets and allowing u-turn/j-turn configuration

Consider treatments needed for off-street multi-use path at driveways and intersections including special signage, blankout signs, etc.

Consistent bike/ped facilities

Ped/Bike crossings should include median refuge (mid-block, stop-control and signalized)

North section - need to clean up vision triangles on west side in areas where ROW is already purchased.

Pebble Creek alignment far west intersection with County D option - soften sharp curves or provide signage for curves approaching signal

Provide neutral or positive left-turn lanes

Provide monotubes at signalized intersections

Improve proposed throat depth at Kame Terrace

Consider providing corridor & unsignalized intersection lighting

Consider high-visibility pedestrian crossing signs, etc., at Rolling Ridge

Other Concerns

Design team should coordinate with the City of Waukesha to determine solutions for pedestrian concerns at Rolling Ridge

West Waukesha Bypass - Design Road Safety Audit

Workshop Notes

July 6, 2011, Strand Associates, Inc.

Cars:

US 18 to County D: Scary section of road. No build or on-alignment rebuild would require a lot of changes.

Responding to crash/incident SB south of Madison Street ; "taking your life in your hands"
Fatality at US 18 & Meadowbrook(County TT) ~2005, 2006.

US 18 & County TT needs capacity, other improvements. If bypass doesn't happen, HSIP improvements are likely.

Managing accidents is "problematic to nightmarish". Crash that would typically require 1-2 squads will require 3-4.

County D from County TT to County X - corridor not major concern, intersections are where crashes occur.

County D and County X: If County D to X is selected, concerns regarding EBR and NBL volumes.

Enforcement - locations to sit. North of US 18 it's not a problem. South of US 18 its really enforcement by presence.

South of US 18 - speeds are lower due to hazardous alignment/no shoulders/objects near roadway. People don't tend to slow down as much in inclement weather - results in higher crashes. Nowhere to go in slippery weather.

If four-lane is selected, a uniform speed limit should be posted.

Future Car Concerns

Future four-lane may encourage higher speed due to wide section, shoulders, etc. Consider altering cross section? Maybe only where driveways exist?

WIS 59 the 85th percentile speed is 55 mph. Enforcement confirms higher speeds on WIS 59.

Cleveland & Pearl are on 5% list.

East portion of WIS 59 - fully access controlled, only public street intersections.

Consider consistent cross-section with curb & gutter inside and outside from US 18 to the north. Could bypass draw higher volumes to County TT and therefore increase congestion in the I-94 EB weave between County SS and County TT?

Trucks:

Existing County TT sees quite a bit of truck traffic. County D & County TT frequently knocking signals down until radius was improved recently.

Future Truck Concerns

More direct alternatives (Pebble Creek) may actually attract additional truck traffic compared to County D - County X alts.

Bypass in general may attract trucks traveling between I-94 and communities to the South/West of Waukesha

** Look at truck %'s for existing and future facility

Current OS/OW route is WIS 59 to east bypass - some routes may use west bypass

** Designers must coordinate with State OS/OW routes

Bikes:

Sunset Park used as trailhead GDT

Future Bike Concerns

Should have consistent facilities on E/W side of road

Pedestrians:

Future Pedestrian Concerns

Ped crossings E-W at Northview Road and other public streets

Should have consistent facilities on each side of the road

All crossings should be designed to accommodate peds within medians

Alternatives List

NB	Future No Build, two-lanes
2ON	On-Alignment, two-lanes
2-TT2-DX	County D to County X Alignment, two-lanes
4-TT2-DX	County D to County X Alignment, four-lanes
2-TT2-PC	West Pebble Creek Alignment, two-lanes
4-TT2-PC	West Pebble Creek Alignment, four-lanes

Section	2035 Alternative	On Existing Alignment				Off Existing Alignment				
		2035 Average Annual Weekday Traffic ^A	Crash Frequency (crashes/year)			2035 Alternative	2035 Average Annual Weekday Traffic ^A	Crash Frequency (crashes/year)		
			Injury and Fatal	Property Damage Only	Total			Injury and Fatal	Property Damage Only	Total
North	NB	20,000 ^B	8.33	16.55	24.88	---	---	---	---	---
	2ON		7.61	15.45	23.06	2DX	26,000 ^C	9.74	19.52	29.26
	2-TT2-DX					2-TT2-PC				
	2-TT2-PC					4-TT2-DX	30,000 ^C	10.39	19.77	30.15
Center	4-TT2-DX	16,000 ^B	6.76	13.33	20.09	4-TT2-PC				
	4-TT2-PC									
	NB		7.20	14.07	21.26	---	---	---	---	---
	2ON		5.49	11.23	16.72	---	---	---	---	---
South	2ON	18,000 ^C	6.41	13.14	19.55	2-TT2-PC	18,000 ^C	5.27	11.56	16.83
	---	---	---	---	---	4-TT2-PC	23,500 ^C	5.71	12.26	17.97
	NB	18,000 ^B	12.16	24.59	36.75	---	---	---	---	---
	2ON		11.83	23.95	35.78	2-TT2-DX	18,000 ^B	11.01	22.26	33.27
	---		---	---	---	4-TT2-DX	18,000 ^B	9.99	20.11	30.13
	---		---	---	---	2-TT2-PC	14,000 ^C	3.01	6.63	9.64
	---		---	---	---	4-TT2-PC	18,000 ^C	3.16	6.92	10.08
	---	---	---	---	---					

NOTE: Frequency should not be directly compared to existing number of crashes per year on the corridor

- A Maximum AWDT used
- B No Build Volumes used
- C Build (with Bypass) Volumes used

Crash Frequency = # Crashes/# years

Note: Crash Frequency calculations Include Intersection Crashes

Waukesha Bypass DRSA - HiSafe Crash Rate Summary

July 27, 2011

Page 2 of 2

Alternatives List

NB	Future No Build, two-lanes
2ON	On-Alignment, two-lanes
2-TT2-DX	County D to County X Alignment, two-lanes
4-TT2-DX	County D to County X Alignment, four-lanes
2-TT2-PC	West Pebble Creek Alignment, two-lanes
4-TT2-PC	West Pebble Creek Alignment, four-lanes

		On Existing Alignment					Off Existing Alignment					
Section	2035 Alternative	2035 Average Annual Weekday Traffic ^A	Length (mi)	Crash Rate (crashes/HMVT)			2035 Alternative	2035 Average Annual Weekday Traffic ^A	Length (mi)	Crash Rate (crashes/HMVT)		
				Injury and Fatal	Property Damage Only	Total				Injury and Fatal	Property Damage Only	Total
North	NB	18,670 ^B	1.66	74	146	220	---	---	---	---	---	---
	2ON			1.66	67	137	204	2DX 2-TT2-PC	22,660 ^C	71	142	213
	2-TT2-PC				26,660 ^C	64	122	187				
	4-TT2-DX 4-TT2-PC											
Center	NB	15,070 ^B	1.96	67	131	197	---	---	---	---	---	---
	2ON			51	104	155	---	---	---	---	---	
	2ON	17,160 ^C		52	107	159	2-TT2-PC	17,160 ^C	2.10	40	88	128
	2-TT2-DX											
	---	---	---	---	---	4-TT2-PC	22,190 ^C	34	72	106		
South	NB	20,800 ^B	2.20	73	147	220	---	---	---	---	---	---
	2ON			71	143	214	2-TT2-DX	20,800 ^B	2.10	69	140	209
	---	---	---	---	---	4-TT2-DX	20,800 ^B	2.10	63	126	189	
	---	---	---	---	---	2-TT2-PC	14,000 ^C	1.20	49	108	157	
	---	---	---	---	---	4-TT2-PC	18,000 ^C	1.20	40	88	128	

NOTE: Rates should not be directly compared to existing crash rates on the corridor, or statewide averages

- A Weighted AWDT used
- B No Build Volumes used
- C Build (with Bypass) Volumes used

Average Yearly Crash Rate = (# Crashes/# years*100,000,000)/(ADT*365*Length), Units = Crashes/Hundred Million Vehicle Miles Traveled (HMVT)

Note: Crash Rate calculations Include Intersection Crashes

Waukesha Bypass DRSA - Weighted ADT Calcs for Crash Rates

Updated September 11, 2012

Segment	Segment Length (mi)				Average Annual Weekday Traffic (AWDT)					
	No Build		Bypass		No Build		2-Lane Bypass		4-Lane (Bypass)	
Rolling Ridge to Woodridge	0.11	0.55	0.11	0.55	18,000	Weighted	24,000	Weighted	28,000	Weighted
Woodridge to Lancaster	0.29		0.29		19,000	18,670	22,000	22,660	26,660	
Lancaster to Northview	0.15		0.15							
Northview to Cold Water Creek	0.67	1.11	0.67							
Cold Water Creek to Sentry Entrance	0.32		0.32							
Sentry Entrance to US 18	0.12		0.12							

Segment	Segment Length (mi)				Average Annual Weekday Traffic (AWDT)					
	No Build		Bypass		No Build		2-Lane Bypass		4-Lane (Bypass)	
US 18 to Fiddlers Creek	0.15	0.53	0.15	0.53	16,000	Weighted	18,000	Weighted	23,500	Weighted
Fiddler's Creek to Kisdon Hill	0.21		0.21		15,070	17,000	17,160	22,000	22,190	
Kisdon Hill to Madison	0.17		0.17							
Madison to Merrill Hills	0.33	1.23	0.66	15,000						
Merrill Hills to Kame	0.31		1.37							
Kame to Shananagi	0.22									
Shananagi to Road	0.24									
Road to MacArthur	0.13									
MacArthur to Glacial Drumlin Trail	0.20	0.20	0.20	0.20	13,000		16,000		20,000	

Segment	Segment Length (mi)				Average Annual Weekday Traffic (AWDT)							
	No Build		Bypass		No Build		2 Lane D to X Bypass		4 Lane D to X Bypass		2-Lane Pebble Bypass	4-Lane (Bypass)
Glacial Drumlin Trail to Green	0.14	0.32	D to X	Pebble	13,000	Weighted	D to X	Weighted	D to X	Weighted	14,000	18,000
Green to Sunset	0.18		1.05	1.20		18,000	20,800	19,000	24,500	22,000		
Sunset to Badger	0.73	1.10			30,000			32,000				
Badger to Ridge View	0.05											
Ridgeview to Genesee Rd	0.32											
Genessee to N. Frontage	0.15	0.68	1.05	29,000								
N. Frontage to S. Frontage	0.25											
S. Frontage to Wis 59	0.28											

Waukesha Bypass DRSA - HiSafe Road Side Fixed Objects Calculations

July 6, 2011

Note: Fixed objects data were determined using a combination of Google Earth and Photologs from June 2011

Object List

UP Utility Pole
Tr Tree
Cont Continuous
FH Fire Hydrant

North Section (Rolling Ridge to US 18)

Segment	Segment Length (mi)	Object	Longitudinal Distance (ft)	Number	Distance to Traveled way (ft)	Fixed Object density	Average Distance
Rolling Ridge to Woodridge	0.11						
		UP		1	6		
		UP		1	10		
		UP		1	10		
		UP		1	6		
		UP		1	6		
						45.5	7.6
Woodridge to Lancaster	0.29						
		UP		1	15		
		UP		1	15		
		UP		1	15		
		UP		1	15		
		UP		1	10		
		UP		1	15		
		UP		1	10		
		UP		1	11		
						27.6	13.3
Lancaster to Northview	0.15						
		Tree		1	27		
		Tree		1	29		
		UP		1	10		
		UP		1	5		
						26.7	17.8
Northview to Cold Water Creek	0.67						
		Tree		1	27		
						1.5	27.0
Cold Water Creek to Sentry Entrance	0.32						
						1.0	30.0
Sentry Entrance to US 18	0.12						
						1.0	30.0

SECTION SUMMARIES

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	8.33	16.55	24.88
Total Predicted Crashes (crashes/year)	8.33	16.55	24.88
County TT/Rolling Ridge Drive	1.02	1.88	2.89
Total Predicted Crashes (crashes/year)	1.02	1.88	2.89
Rolling Ridge to Woodridge	0.11	0.27	0.38
Total Predicted Crashes (crashes/year)	0.11	0.27	0.38
County TT/Woodridge Lane	0.78	1.17	1.95
Total Predicted Crashes (crashes/year)	0.78	1.17	1.95
Woodridge to Lancaster	0.41	1.08	1.49
Total Predicted Crashes (crashes/year)	0.41	1.08	1.49
County TT/Lancaster Drive	0.73	1.11	1.83
Total Predicted Crashes (crashes/year)	0.73	1.11	1.83
Lancaster to Northview	0.27	0.70	0.97
Total Predicted Crashes (crashes/year)	0.27	0.70	0.97
County TT/Northview Road	1.37	2.73	4.09
Total Predicted Crashes (crashes/year)	1.37	2.73	4.09

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Northview to Cold Water Creek	0.94	2.48	3.42
Total Predicted Crashes (crashes/year)	0.94	2.48	3.42
County TT/Cold Water Creek Drive	0.49	0.73	1.23
Total Predicted Crashes (crashes/year)	0.49	0.73	1.23
Cold Water Creek to Sentry Entrance	0.40	1.06	1.47
Total Predicted Crashes (crashes/year)	0.40	1.06	1.47
County TT/Sentry Entrance	0.69	0.96	1.65
Total Predicted Crashes (crashes/year)	0.69	0.96	1.65
Sentry Entrance to US 18	0.13	0.35	0.49
Total Predicted Crashes (crashes/year)	0.13	0.35	0.49
County TT/US 18	1.01	2.02	3.03
Total Predicted Crashes (crashes/year)	1.01	2.02	3.03

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	7.61	15.45	23.06
Total Predicted Crashes (crashes/year)	7.61	15.45	23.06
County TT/Rolling Ridge Drive	1.02	1.88	2.89
Total Predicted Crashes (crashes/year)	1.02	1.88	2.89
Rolling Ridge to Woodridge	0.13	0.33	0.45
Total Predicted Crashes (crashes/year)	0.13	0.33	0.45
County TT/Woodridge Lane	0.42	0.63	1.05
Total Predicted Crashes (crashes/year)	0.42	0.63	1.05
Woodridge to Lancaster	0.38	1.01	1.39
Total Predicted Crashes (crashes/year)	0.38	1.01	1.39
County TT/Lancaster Drive	0.39	0.60	0.99
Total Predicted Crashes (crashes/year)	0.39	0.60	0.99
Lancaster to Northview	0.26	0.68	0.93
Total Predicted Crashes (crashes/year)	0.26	0.68	0.93
County TT/Northview Road	1.37	2.73	4.09
Total Predicted Crashes (crashes/year)	1.37	2.73	4.09

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Northview to Cold Water Creek	0.94	2.48	3.42
Total Predicted Crashes (crashes/year)	0.94	2.48	3.42
County TT/Cold Water Creek Drive	0.49	0.73	1.23
Total Predicted Crashes (crashes/year)	0.49	0.73	1.23
Cold Water Creek to Sentry Entrance	0.40	1.06	1.47
Total Predicted Crashes (crashes/year)	0.40	1.06	1.47
County TT/Sentry Entrance	0.69	0.96	1.65
Total Predicted Crashes (crashes/year)	0.69	0.96	1.65
Sentry Entrance to US 18	0.13	0.35	0.49
Total Predicted Crashes (crashes/year)	0.13	0.35	0.49
County TT/US 18	1.01	2.02	3.03
Total Predicted Crashes (crashes/year)	1.01	2.02	3.03

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	6.76	13.33	20.09
Total Predicted Crashes (crashes/year)	6.76	13.33	20.09
County TT/Rolling Ridge Drive	0.99	1.88	2.87
Total Predicted Crashes (crashes/year)	0.99	1.88	2.87
Rolling Ridge to Woodridge	0.10	0.25	0.34
Total Predicted Crashes (crashes/year)	0.10	0.25	0.34
County TT/Woodridge Lane	0.42	0.63	1.05
Total Predicted Crashes (crashes/year)	0.42	0.63	1.05
Woodridge to Lancaster	0.28	0.73	1.02
Total Predicted Crashes (crashes/year)	0.28	0.73	1.02
County TT/Lancaster Drive	0.39	0.60	0.99
Total Predicted Crashes (crashes/year)	0.39	0.60	0.99
Lancaster to Northview	0.19	0.49	0.68
Total Predicted Crashes (crashes/year)	0.19	0.49	0.68
County TT/Northview Road	1.11	2.21	3.32

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	1.11	2.21	3.32
Northview to Cold Water Creek	0.69	1.80	2.49
Total Predicted Crashes (crashes/year)	0.69	1.80	2.49
County TT/Cold Water Creek Drive	0.49	0.73	1.23
Total Predicted Crashes (crashes/year)	0.49	0.73	1.23
Cold Water Creek to Sentry Entrance	0.30	0.78	1.08
Total Predicted Crashes (crashes/year)	0.30	0.78	1.08
County TT/Sentry Entrance	0.69	0.96	1.65
Total Predicted Crashes (crashes/year)	0.69	0.96	1.65
Sentry Entrance to US 18	0.10	0.26	0.36
Total Predicted Crashes (crashes/year)	0.10	0.26	0.36
County TT/US 18	1.01	2.02	3.03
Total Predicted Crashes (crashes/year)	1.01	2.02	3.03

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	9.74	19.52	29.26
Total Predicted Crashes (crashes/year)	9.74	19.52	29.26
County TT/Rolling Ridge Drive	1.44	2.62	4.06
Total Predicted Crashes (crashes/year)	1.44	2.62	4.06
Rolling Ridge to Woodridge	0.19	0.50	0.69
Total Predicted Crashes (crashes/year)	0.19	0.50	0.69
County TT/Woodridge Lane	0.57	0.81	1.38
Total Predicted Crashes (crashes/year)	0.57	0.81	1.38
Woodridge to Lancaster	0.58	1.53	2.11
Total Predicted Crashes (crashes/year)	0.58	1.53	2.11
County TT/Lancaster Drive	0.53	0.77	1.30
Total Predicted Crashes (crashes/year)	0.53	0.77	1.30
Lancaster to Northview	0.39	1.02	1.41
Total Predicted Crashes (crashes/year)	0.39	1.02	1.41
County TT/Northview Road	1.66	3.24	4.90
Total Predicted Crashes (crashes/year)	1.66	3.24	4.90

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Northview to Cold Water Creek	1.16	3.07	4.23
Total Predicted Crashes (crashes/year)	1.16	3.07	4.23
County TT/Cold Water Creek Drive	0.60	0.86	1.45
Total Predicted Crashes (crashes/year)	0.60	0.86	1.45
Cold Water Creek to Sentry Entrance	0.50	1.32	1.81
Total Predicted Crashes (crashes/year)	0.50	1.32	1.81
County TT/Sentry Entrance	0.83	1.12	1.95
Total Predicted Crashes (crashes/year)	0.83	1.12	1.95
Sentry Entrance to US 18	0.17	0.44	0.60
Total Predicted Crashes (crashes/year)	0.17	0.44	0.60
County TT/US 18	1.14	2.24	3.37
Total Predicted Crashes (crashes/year)	1.14	2.24	3.37

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	10.39	19.77	30.15
Total Predicted Crashes (crashes/year)	10.39	19.77	30.15
County TT/Rolling Ridge Drive	1.72	3.15	4.87
Total Predicted Crashes (crashes/year)	1.72	3.15	4.87
Rolling Ridge to Woodridge	0.16	0.41	0.58
Total Predicted Crashes (crashes/year)	0.16	0.41	0.58
County TT/Woodridge Lane	0.68	0.94	1.62
Total Predicted Crashes (crashes/year)	0.68	0.94	1.62
Woodridge to Lancaster	0.49	1.27	1.76
Total Predicted Crashes (crashes/year)	0.49	1.27	1.76
County TT/Lancaster Drive	0.63	0.89	1.52
Total Predicted Crashes (crashes/year)	0.63	0.89	1.52
Lancaster to Northview	0.32	0.84	1.16
Total Predicted Crashes (crashes/year)	0.32	0.84	1.16
County TT/Northview Road	1.62	3.07	4.69

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	1.62	3.07	4.69
Northview to Cold Water Creek	1.02	2.62	3.64
Total Predicted Crashes (crashes/year)	1.02	2.62	3.64
County TT/Cold Water Creek Drive	0.72	1.00	1.72
Total Predicted Crashes (crashes/year)	0.72	1.00	1.72
Cold Water Creek to Sentry Entrance	0.44	1.14	1.57
Total Predicted Crashes (crashes/year)	0.44	1.14	1.57
County TT/Sentry Entrance	1.00	1.30	2.30
Total Predicted Crashes (crashes/year)	1.00	1.30	2.30
Sentry Entrance to US 18	0.15	0.38	0.53
Total Predicted Crashes (crashes/year)	0.15	0.38	0.53
County TT/US 18	1.44	2.77	4.21
Total Predicted Crashes (crashes/year)	1.44	2.77	4.21

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	7.20	14.07	21.26
Total Predicted Crashes (crashes/year)	7.20	14.07	21.26
US 18 to Fiddlers Creek	0.22	0.59	0.81
Total Predicted Crashes (crashes/year)	0.22	0.59	0.81
County TT/Fiddlers Creek Drive	0.67	1.03	1.70
Total Predicted Crashes (crashes/year)	0.67	1.03	1.70
Fiddlers Creek to Kisdon Hill	0.35	0.90	1.25
Total Predicted Crashes (crashes/year)	0.35	0.90	1.25
County TT/Kisdon Hill Drive	0.27	0.36	0.64
Total Predicted Crashes (crashes/year)	0.27	0.36	0.64
Kisdon Hill to Madison	0.23	0.62	0.86
Total Predicted Crashes (crashes/year)	0.23	0.62	0.86
County TT/Madison Street	1.14	1.63	2.78
Total Predicted Crashes (crashes/year)	1.14	1.63	2.78
Madison to Merrill Hills	0.37	0.97	1.33
Total Predicted Crashes (crashes/year)	0.37	0.97	1.33

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
County TT/Merril Hills Court	0.44	0.77	1.20
Total Predicted Crashes (crashes/year)	0.44	0.77	1.20
Merril Hills to Kame	0.39	1.00	1.39
Total Predicted Crashes (crashes/year)	0.39	1.00	1.39
County TT/Kame Terrace	0.58	0.97	1.54
Total Predicted Crashes (crashes/year)	0.58	0.97	1.54
Kame to Shananagi	0.26	0.68	0.93
Total Predicted Crashes (crashes/year)	0.26	0.68	0.93
County TT/Shananagi Lane	0.51	0.89	1.40
Total Predicted Crashes (crashes/year)	0.51	0.89	1.40
Shananagi to Road	0.30	0.76	1.06
Total Predicted Crashes (crashes/year)	0.30	0.76	1.06
County TT/Road	0.27	0.26	0.52
Total Predicted Crashes (crashes/year)	0.27	0.26	0.52
Road to MacArthur	0.15	0.40	0.55
Total Predicted Crashes (crashes/year)	0.15	0.40	0.55
County TT/MacArthur Road	0.86	1.70	2.56
Total Predicted Crashes (crashes/year)	0.86	1.70	2.56
MacArthur to Glacial Drumlin Trail	0.21	0.54	0.75

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.21	0.54	0.75

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	5.49	11.23	16.72
Total Predicted Crashes (crashes/year)	5.49	11.23	16.72
US 18 to Fiddlers Creek	0.21	0.56	0.76
Total Predicted Crashes (crashes/year)	0.21	0.56	0.76
County TT/Fiddlers Creek Drive	0.49	0.76	1.24
Total Predicted Crashes (crashes/year)	0.49	0.76	1.24
Fiddlers Creek to Kisdon Hill	0.25	0.65	0.91
Total Predicted Crashes (crashes/year)	0.25	0.65	0.91
County TT/Kisdon Hill Drive	0.27	0.36	0.64
Total Predicted Crashes (crashes/year)	0.27	0.36	0.64
Kisdon Hill to Madison	0.21	0.56	0.76
Total Predicted Crashes (crashes/year)	0.21	0.56	0.76
County TT/Madison Street	0.77	1.53	2.29
Total Predicted Crashes (crashes/year)	0.77	1.53	2.29
Madison to Merrill Hills	0.29	0.78	1.07

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.29	0.78	1.07
County TT/Merril Hills Court	0.44	0.77	1.20
Total Predicted Crashes (crashes/year)	0.44	0.77	1.20
Merril Hills to Kame	0.32	0.83	1.15
Total Predicted Crashes (crashes/year)	0.32	0.83	1.15
County TT/Kame Terrace	0.39	0.65	1.04
Total Predicted Crashes (crashes/year)	0.39	0.65	1.04
Kame to Shananagi	0.19	0.51	0.70
Total Predicted Crashes (crashes/year)	0.19	0.51	0.70
County TT/Shananagi Lane	0.44	0.77	1.20
Total Predicted Crashes (crashes/year)	0.44	0.77	1.20
Shananagi to Road	0.23	0.58	0.81
Total Predicted Crashes (crashes/year)	0.23	0.58	0.81
County TT/Road	0.23	0.22	0.45
Total Predicted Crashes (crashes/year)	0.23	0.22	0.45
Road to MacArthur	0.10	0.28	0.38
Total Predicted Crashes (crashes/year)	0.10	0.28	0.38
County TT/MacArthur Road	0.50	0.99	1.48
Total Predicted Crashes (crashes/year)	0.50	0.99	1.48

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
MacArthur to Glacial Drumlin Trail	0.18	0.46	0.63
Total Predicted Crashes (crashes/year)	0.18	0.46	0.63

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	6.41	13.14	19.55
Total Predicted Crashes (crashes/year)	6.41	13.14	19.55
US 18 to Fiddlers Creek	0.25	0.66	0.90
Total Predicted Crashes (crashes/year)	0.25	0.66	0.90
County TT/Fiddlers Creek Drive	0.56	0.84	1.40
Total Predicted Crashes (crashes/year)	0.56	0.84	1.40
Fiddlers Creek to Kisdon Hill	0.30	0.76	1.06
Total Predicted Crashes (crashes/year)	0.30	0.76	1.06
County TT/Kisdon Hill Drive	0.32	0.43	0.75
Total Predicted Crashes (crashes/year)	0.32	0.43	0.75
Kisdon Hill to Madison	0.25	0.66	0.90
Total Predicted Crashes (crashes/year)	0.25	0.66	0.90
County TT/Madison Street	0.84	1.65	2.49
Total Predicted Crashes (crashes/year)	0.84	1.65	2.49
Madison to Merrill Hills	0.35	0.92	1.27

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.35	0.92	1.27
County TT/Merril Hills Court	0.50	0.85	1.35
Total Predicted Crashes (crashes/year)	0.50	0.85	1.35
Merril Hills to Kame	0.38	0.98	1.36
Total Predicted Crashes (crashes/year)	0.38	0.98	1.36
County TT/Kame Terrace	0.45	0.79	1.24
Total Predicted Crashes (crashes/year)	0.45	0.79	1.24
Kame to Shananagi	0.23	0.60	0.83
Total Predicted Crashes (crashes/year)	0.23	0.60	0.83
County TT/Shananagi Lane	0.50	0.85	1.35
Total Predicted Crashes (crashes/year)	0.50	0.85	1.35
Shananagi to Road	0.27	0.69	0.95
Total Predicted Crashes (crashes/year)	0.27	0.69	0.95
County TT/Road	0.26	0.27	0.53
Total Predicted Crashes (crashes/year)	0.26	0.27	0.53
Road to MacArthur	0.13	0.33	0.45
Total Predicted Crashes (crashes/year)	0.13	0.33	0.45
County TT/MacArthur Road	0.61	1.26	1.86
Total Predicted Crashes (crashes/year)	0.61	1.26	1.86

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
MacArthur to Glacial Drumlin Trail	0.23	0.60	0.83
Total Predicted Crashes (crashes/year)	0.23	0.60	0.83

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	5.27	11.56	16.83
Total Predicted Crashes (crashes/year)	5.27	11.56	16.83
US 18 to Fiddlers Creek	0.25	0.66	0.90
Total Predicted Crashes (crashes/year)	0.25	0.66	0.90
County TT/Fiddlers Creek Drive	0.56	0.84	1.40
Total Predicted Crashes (crashes/year)	0.56	0.84	1.40
Fiddlers Creek to Kisdon Hill	0.30	0.76	1.06
Total Predicted Crashes (crashes/year)	0.30	0.76	1.06
County TT/Kisdon Hill Drive	0.32	0.43	0.75
Total Predicted Crashes (crashes/year)	0.32	0.43	0.75
Kisdon Hill to Madison	0.25	0.66	0.90
Total Predicted Crashes (crashes/year)	0.25	0.66	0.90
County TT/Madison Street	0.84	1.65	2.49
Total Predicted Crashes (crashes/year)	0.84	1.65	2.49
Madison to Kame	0.70	1.84	2.54

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.70	1.84	2.54
County TT/Kame Terrace	0.45	0.79	1.24
Total Predicted Crashes (crashes/year)	0.45	0.79	1.24
Kame to MacArthur	0.80	2.12	2.92
Total Predicted Crashes (crashes/year)	0.80	2.12	2.92
County TT/MacArthur Road	0.61	1.26	1.86
Total Predicted Crashes (crashes/year)	0.61	1.26	1.86
MacArthur to Glacial Drumlin Trail	0.21	0.56	0.76
Total Predicted Crashes (crashes/year)	0.21	0.56	0.76

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	5.71	12.26	17.97
Total Predicted Crashes (crashes/year)	5.71	12.26	17.97
US 18 to Fiddlers Creek	0.26	0.67	0.93
Total Predicted Crashes (crashes/year)	0.26	0.67	0.93
County TT/Fiddlers Creek Drive	0.55	0.79	1.35
Total Predicted Crashes (crashes/year)	0.55	0.79	1.35
Fiddlers Creek to Kisdon Hill	0.27	0.70	0.98
Total Predicted Crashes (crashes/year)	0.27	0.70	0.98
County TT/Kisdon Hill Drive	0.46	0.65	1.11
Total Predicted Crashes (crashes/year)	0.46	0.65	1.11
Kisdon Hill to Madison	0.26	0.67	0.93
Total Predicted Crashes (crashes/year)	0.26	0.67	0.93
County TT/Madison Street	0.68	1.24	1.92
Total Predicted Crashes (crashes/year)	0.68	1.24	1.92
Madison to Kame	0.72	1.86	2.58

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.72	1.86	2.58
County TT/Kame Terrace	0.64	1.16	1.80
Total Predicted Crashes (crashes/year)	0.64	1.16	1.80
Kame to MacArthur	0.84	2.16	3.00
Total Predicted Crashes (crashes/year)	0.84	2.16	3.00
County TT/MacArthur Road	0.83	1.79	2.62
Total Predicted Crashes (crashes/year)	0.83	1.79	2.62
MacArthur to Glacial Drumlin Trail	0.21	0.55	0.76
Total Predicted Crashes (crashes/year)	0.21	0.55	0.76

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	12.16	24.59	36.75
Total Predicted Crashes (crashes/year)	12.16	24.59	36.75
Glacial Drumlin Trail to Green	0.14	0.34	0.47
Total Predicted Crashes (crashes/year)	0.14	0.34	0.47
County TT/Green Lane	0.38	0.51	0.89
Total Predicted Crashes (crashes/year)	0.38	0.51	0.89
Green to County D	0.22	0.56	0.78
Total Predicted Crashes (crashes/year)	0.22	0.56	0.78
County D/County TT	1.63	3.26	4.89
Total Predicted Crashes (crashes/year)	1.63	3.26	4.89
County TT to Badger	1.01	2.68	3.69
Total Predicted Crashes (crashes/year)	1.01	2.68	3.69
County D/Badger Drive	0.42	0.73	1.15
Total Predicted Crashes (crashes/year)	0.42	0.73	1.15
Badger to Ridge	0.14	0.37	0.52
Total Predicted Crashes (crashes/year)	0.14	0.37	0.52

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
County D/Ridge Road	0.53	0.71	1.24
Total Predicted Crashes (crashes/year)	0.53	0.71	1.24
Ridge to Shopping Center	0.29	0.75	1.04
Total Predicted Crashes (crashes/year)	0.29	0.75	1.04
County D/Shopping Center	0.70	1.20	1.91
Total Predicted Crashes (crashes/year)	0.70	1.20	1.91
Shopping Center to County X	0.30	0.76	1.06
Total Predicted Crashes (crashes/year)	0.30	0.76	1.06
County X/County D	1.64	3.12	4.77
Total Predicted Crashes (crashes/year)	1.64	3.12	4.77
County D to N. Frontage	0.25	0.66	0.91
Total Predicted Crashes (crashes/year)	0.25	0.66	0.91
County X/North Frontage Road	0.30	0.30	0.60
Total Predicted Crashes (crashes/year)	0.30	0.30	0.60
N. Frontage to Ridge	0.76	1.98	2.74
Total Predicted Crashes (crashes/year)	0.76	1.98	2.74
County X/Ridge Road	0.74	0.99	1.73
Total Predicted Crashes (crashes/year)	0.74	0.99	1.73
Ridge to WIS 59	0.78	2.02	2.80

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.78	2.02	2.80
County X/WIS 59	1.93	3.65	5.58
Total Predicted Crashes (crashes/year)	1.93	3.65	5.58

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	11.83	23.95	35.78
Total Predicted Crashes (crashes/year)	11.83	23.95	35.78
Glacial Drumlin Trail to Green	0.11	0.27	0.37
Total Predicted Crashes (crashes/year)	0.11	0.27	0.37
County TT/Green Lane	0.22	0.30	0.52
Total Predicted Crashes (crashes/year)	0.22	0.30	0.52
Green to County D	0.17	0.45	0.62
Total Predicted Crashes (crashes/year)	0.17	0.45	0.62
County D/County TT	1.55	3.10	4.65
Total Predicted Crashes (crashes/year)	1.55	3.10	4.65
County TT to Badger	0.87	2.31	3.18
Total Predicted Crashes (crashes/year)	0.87	2.31	3.18
County D/Badger Drive	0.42	0.73	1.15
Total Predicted Crashes (crashes/year)	0.42	0.73	1.15
Badger to Ridge	0.13	0.34	0.47

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.13	0.34	0.47
County D/Ridge Road	0.46	0.61	1.06
Total Predicted Crashes (crashes/year)	0.46	0.61	1.06
Ridge to Shopping Center	0.29	0.75	1.04
Total Predicted Crashes (crashes/year)	0.29	0.75	1.04
County D/Shopping Center	0.70	1.20	1.91
Total Predicted Crashes (crashes/year)	0.70	1.20	1.91
Shopping Center to County X	0.27	0.70	0.96
Total Predicted Crashes (crashes/year)	0.27	0.70	0.96
County X/County D	1.64	3.12	4.77
Total Predicted Crashes (crashes/year)	1.64	3.12	4.77
County D to N. Frontage	0.25	0.66	0.91
Total Predicted Crashes (crashes/year)	0.25	0.66	0.91
County X/North Frontage Road	0.53	0.78	1.32
Total Predicted Crashes (crashes/year)	0.53	0.78	1.32
N. Frontage to Ridge	0.76	1.98	2.74
Total Predicted Crashes (crashes/year)	0.76	1.98	2.74
County X/Ridge Road	0.74	0.99	1.73
Total Predicted Crashes (crashes/year)	0.74	0.99	1.73

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Ridge to WIS 59	0.78	2.02	2.80
Total Predicted Crashes (crashes/year)	0.78	2.02	2.80
County X/WIS 59	1.93	3.65	5.58
Total Predicted Crashes (crashes/year)	1.93	3.65	5.58

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	11.01	22.26	33.27
Total Predicted Crashes (crashes/year)	11.01	22.26	33.27
Glacial Drumlin Trail to County TT	0.32	0.84	1.15
Total Predicted Crashes (crashes/year)	0.32	0.84	1.15
County TT/County D	0.90	1.79	2.69
Total Predicted Crashes (crashes/year)	0.90	1.79	2.69
County D to Badger	0.62	1.64	2.26
Total Predicted Crashes (crashes/year)	0.62	1.64	2.26
County D/Badger Drive	0.70	1.20	1.91
Total Predicted Crashes (crashes/year)	0.70	1.20	1.91
Badger to Ridge	0.13	0.34	0.47
Total Predicted Crashes (crashes/year)	0.13	0.34	0.47
County D/Ridge Road	0.46	0.61	1.06
Total Predicted Crashes (crashes/year)	0.46	0.61	1.06
Ridge to Shopping Center	0.29	0.74	1.02

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (crashes/year)	0.29	0.74	1.02
County D/Shopping Center	0.70	1.20	1.91
Total Predicted Crashes (crashes/year)	0.70	1.20	1.91
Shopping Center to County X	0.27	0.70	0.96
Total Predicted Crashes (crashes/year)	0.27	0.70	0.96
County X/County D	1.65	3.12	4.77
Total Predicted Crashes (crashes/year)	1.65	3.12	4.77
County D to N. Frontage	0.25	0.66	0.91
Total Predicted Crashes (crashes/year)	0.25	0.66	0.91
County X/North Frontage Road	0.53	0.78	1.32
Total Predicted Crashes (crashes/year)	0.53	0.78	1.32
N. Frontage to Ridge	0.76	1.98	2.74
Total Predicted Crashes (crashes/year)	0.76	1.98	2.74
County X/Ridge Road	0.74	0.99	1.73
Total Predicted Crashes (crashes/year)	0.74	0.99	1.73
Ridge to WIS 59	0.78	2.02	2.80
Total Predicted Crashes (crashes/year)	0.78	2.02	2.80
County X/WIS 59	1.93	3.65	5.58
Total Predicted Crashes (crashes/year)	1.93	3.65	5.58

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	9.99	20.14	30.13
Total Predicted Crashes (crashes/year)	9.99	20.14	30.13
Glacial Drumlin Trail to County D	0.25	0.67	0.92
Total Predicted Crashes (crashes/year)	0.25	0.67	0.92
County TT/County D	0.90	1.79	2.69
Total Predicted Crashes (crashes/year)	0.90	1.79	2.69
County D to Badger	0.47	1.22	1.68
Total Predicted Crashes (crashes/year)	0.47	1.22	1.68
County D/Badger Drive	0.47	0.81	1.28
Total Predicted Crashes (crashes/year)	0.47	0.81	1.28
Badger to Ridge	0.10	0.24	0.34
Total Predicted Crashes (crashes/year)	0.10	0.24	0.34
County D/Ridge Road	0.31	0.41	0.72
Total Predicted Crashes (crashes/year)	0.31	0.41	0.72
Ridge to Shopping Center	0.19	0.50	0.69
Total Predicted Crashes (crashes/year)	0.19	0.50	0.69

Analysis Summary Results

Collision Type	Predicted Crash Frequency		
	Fatal and Injury	Property Damage Only	Total
County D/Shopping Center	0.47	0.81	1.28
Total Predicted Crashes (crashes/year)	0.47	0.81	1.28
Shopping Center to County X	0.19	0.49	0.68
Total Predicted Crashes (crashes/year)	0.19	0.49	0.68
County X/County D	1.65	3.12	4.77
Total Predicted Crashes (crashes/year)	1.65	3.12	4.77
County D to N. Frontage	0.25	0.66	0.91
Total Predicted Crashes (crashes/year)	0.25	0.66	0.91
County X/North Frontage Road	0.53	0.78	1.32
Total Predicted Crashes (crashes/year)	0.53	0.78	1.32
N. Frontage to Ridge	0.76	1.98	2.74
Total Predicted Crashes (crashes/year)	0.76	1.98	2.74
County X/Ridge Road	0.74	0.99	1.73
Total Predicted Crashes (crashes/year)	0.74	0.99	1.73
Ridge to WIS 59	0.78	2.02	2.80
Total Predicted Crashes (crashes/year)	0.78	2.02	2.80
County X/WIS 59	1.93	3.65	5.58
Total Predicted Crashes (crashes/year)	1.93	3.65	5.58

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane Pebble Creek (2PC)	Analysis Date	6/28/2011 3:29 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results**Predicted Crash Frequency**

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	3.01	6.63	9.64
Total Predicted Crashes (crashes/year)	3.01	6.63	9.64
Glacial Drumlin Trail to County D	0.44	1.16	1.59
Total Predicted Crashes (crashes/year)	0.44	1.16	1.59
County TT/County D	0.72	1.45	2.16
Total Predicted Crashes (crashes/year)	0.72	1.45	2.16
County D to Wis 59	0.63	1.67	2.30
Total Predicted Crashes (crashes/year)	0.63	1.67	2.30
WIS 59/County X/County TT	1.22	2.37	3.59
Total Predicted Crashes (crashes/year)	1.22	2.37	3.59

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane Pebble Creek (4PC)	Analysis Date	6/28/2011 11:47 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Analysis Summary Results

Predicted Crash Frequency

Collision Type	Fatal and Injury	Property Damage Only	Total
Total Predicted Crashes (entire study period)	3.16	6.92	10.08
Total Predicted Crashes (crashes/year)	3.16	6.92	10.08
Glacial Drumlin Trail to County D	0.47	1.22	1.68
Total Predicted Crashes (crashes/year)	0.47	1.22	1.68
County TT/County D	0.93	1.82	2.75
Total Predicted Crashes (crashes/year)	0.93	1.82	2.75
County D to Wis 59	0.66	1.72	2.38
Total Predicted Crashes (crashes/year)	0.66	1.72	2.38
WIS 59/County X/County TT	1.10	2.17	3.27
Total Predicted Crashes (crashes/year)	1.10	2.17	3.27

NORTH SECTION
US 18/ SUMMIT AVENUE TO ROLLING RIDGE DRIVE

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	2500
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	400
Maximum number of lanes crossed by a pedestrian	5
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.02	1.88	2.89

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.392	0.847	1.239
Head-on collision	0.043	0.053	0.096
Angle collision	0.303	0.428	0.731
Sideswipe	0.086	0.056	0.142
Other multiple-vehicle collision	0.048	0.370	0.418
Subtotal	0.872	1.754	2.626

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.033	0.108	0.141
Collision with other object	0.003	0.009	0.012
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.057		0.057
Collision with bicycle	0.042		0.042
Subtotal	0.143	0.124	0.267
Total	1.015	1.878	2.893

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.1
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	45
Offset to roadside fixed objects (ft)	8
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.11	0.27	0.38
Crash rate (crashes/mi/year)	1.1	2.7	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.071	0.142	0.213
Head-on collision	0.002	0.002	0.004
Angle collision	0.003	0.008	0.011
Sideswipe, same direction	0.004	0.048	0.052
Sideswipe, opposite direction	0.001	0.000	0.001
Other multiple-vehicle collision	0.004	0.015	0.019
Subtotal	0.085	0.215	0.300
Single-Vehicle Collisions			
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.006	0.048	0.054
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.006	0.006	0.012
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.002		0.002
Subtotal	0.021	0.059	0.080
Total	0.106	0.274	0.380

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	1260
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.78	1.17	1.95

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.219	0.386	0.605
Head-on collision	0.027	0.031	0.058
Angle collision	0.286	0.345	0.631
Sideswipe	0.079	0.045	0.124
Other multiple-vehicle collision	0.039	0.224	0.263
Subtotal	0.650	1.031	1.681
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.037	0.118	0.155
Collision with other object	0.005	0.010	0.015
Other single-vehicle collision	0.003	0.001	0.004
Single-vehicle noncollision	0.010	0.007	0.017
Collision with pedestrian	0.041		0.041
Collision with bicycle	0.034		0.034
Subtotal	0.130	0.140	0.270
Total	0.780	1.171	1.951

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	28
Offset to roadside fixed objects (ft)	13
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.41	1.08	1.49
Crash rate (crashes/mi/year)	1.4	3.6	5.0

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.235	0.614	0.849
Head-on collision	0.022	0.003	0.025
Angle collision	0.027	0.062	0.089
Sideswipe, same direction	0.005	0.024	0.029
Sideswipe, opposite direction	0.024	0.043	0.067
Other multiple-vehicle collision	0.009	0.042	0.051
Subtotal	0.335	0.816	1.151
Single-Vehicle Collisions			
Collision with animal	0.002	0.017	0.019
Collision with fixed object	0.044	0.201	0.245
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.015	0.043	0.058
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.006		0.006
Subtotal	0.075	0.264	0.339
Total	0.410	1.080	1.490

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	970
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.73	1.11	1.83

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.204	0.363	0.567
Head-on collision	0.025	0.029	0.054
Angle collision	0.265	0.325	0.590
Sideswipe	0.073	0.043	0.116
Other multiple-vehicle collision	0.036	0.211	0.247
Subtotal	0.603	0.971	1.574
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.035	0.114	0.149
Collision with other object	0.005	0.009	0.014
Other single-vehicle collision	0.003	0.001	0.004
Single-vehicle noncollision	0.009	0.007	0.016
Collision with pedestrian	0.039		0.039
Collision with bicycle	0.032		0.032
Subtotal	0.123	0.135	0.258
Total	0.726	1.106	1.832

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	1
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	27
Offset to roadside fixed objects (ft)	18
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.70	0.97
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.153	0.398	0.551
Head-on collision	0.014	0.002	0.016
Angle collision	0.018	0.040	0.058
Sideswipe, same direction	0.003	0.016	0.019
Sideswipe, opposite direction	0.015	0.028	0.043
Other multiple-vehicle collision	0.006	0.027	0.033
Subtotal	0.218	0.531	0.749
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.029	0.131	0.160
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.010	0.028	0.038
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.049	0.172	0.221
Total	0.267	0.703	0.970

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	12000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	10
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.37	2.73	4.09

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.551	1.228	1.779
Head-on collision	0.060	0.076	0.136
Angle collision	0.425	0.620	1.045
Sideswipe	0.121	0.081	0.202
Other multiple-vehicle collision	0.067	0.537	0.604
Subtotal	1.224	2.542	3.766

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.052	0.162	0.214
Collision with other object	0.005	0.013	0.018
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.010	0.006	0.016
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.060		0.060
Subtotal	0.143	0.185	0.328
Total	1.367	2.727	4.094

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	27
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.94	2.48	3.42
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.561	1.464	2.025
Head-on collision	0.052	0.008	0.060
Angle collision	0.065	0.149	0.214
Sideswipe, same direction	0.012	0.058	0.070
Sideswipe, opposite direction	0.056	0.104	0.160
Other multiple-vehicle collision	0.022	0.100	0.122
Subtotal	0.768	1.883	2.651
Single-Vehicle Collisions			
Collision with animal	0.004	0.039	0.043
Collision with fixed object	0.098	0.454	0.552
Collision with other object	0.001	0.008	0.009
Other single-vehicle collision	0.033	0.097	0.130
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.014		0.014
Subtotal	0.167	0.598	0.765
Total	0.935	2.481	3.416

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	19000
AADTminor	1470
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.49	0.73	1.23

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.140	0.242	0.382
Head-on collision	0.017	0.019	0.036
Angle collision	0.182	0.217	0.399
Sideswipe	0.050	0.029	0.079
Other multiple-vehicle collision	0.025	0.141	0.166
Subtotal	0.414	0.648	1.062
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.071	0.093
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.021		0.021
Subtotal	0.080	0.084	0.164
Total	0.494	0.732	1.226

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.40	1.06	1.47
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.240	0.628	0.868
Head-on collision	0.022	0.003	0.025
Angle collision	0.028	0.064	0.092
Sideswipe, same direction	0.005	0.025	0.030
Sideswipe, opposite direction	0.024	0.044	0.068
Other multiple-vehicle collision	0.010	0.043	0.053
Subtotal	0.329	0.807	1.136
Single-Vehicle Collisions			
Collision with animal	0.002	0.017	0.019
Collision with fixed object	0.042	0.195	0.237
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.014	0.042	0.056
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.006		0.006
Subtotal	0.072	0.257	0.329
Total	0.401	1.064	1.465

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	19000
AADTminor	5020
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.69	0.96	1.65

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.197	0.322	0.519
Head-on collision	0.024	0.026	0.050
Angle collision	0.257	0.288	0.545
Sideswipe	0.071	0.038	0.109
Other multiple-vehicle collision	0.035	0.187	0.222
Subtotal	0.584	0.861	1.445
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.083	0.109
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.028		0.028
Subtotal	0.101	0.099	0.200
Total	0.685	0.960	1.645

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.13	0.35	0.49
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.080	0.209	0.289
Head-on collision	0.007	0.001	0.008
Angle collision	0.009	0.021	0.030
Sideswipe, same direction	0.002	0.008	0.010
Sideswipe, opposite direction	0.008	0.015	0.023
Other multiple-vehicle collision	0.003	0.014	0.017
Subtotal	0.109	0.268	0.377
Single-Vehicle Collisions			
Collision with animal	0.000	0.006	0.006
Collision with fixed object	0.014	0.065	0.079
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.014	0.019
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.023	0.086	0.109
Total	0.132	0.354	0.486

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 1:58 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	17500
AADTminor	16000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	20
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.01	2.02	3.03

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.399	0.907	1.306
Head-on collision	0.043	0.056	0.099
Angle collision	0.308	0.458	0.766
Sideswipe	0.088	0.060	0.148
Other multiple-vehicle collision	0.049	0.396	0.445
Subtotal	0.887	1.877	2.764

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.041	0.124	0.165
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.024		0.024
Collision with bicycle	0.044		0.044
Subtotal	0.123	0.142	0.265
Total	1.010	2.019	3.029

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	2500
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	400
Maximum number of lanes crossed by a pedestrian	5
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.02	1.88	2.89

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.392	0.847	1.239
Head-on collision	0.043	0.053	0.096
Angle collision	0.303	0.428	0.731
Sideswipe	0.086	0.056	0.142
Other multiple-vehicle collision	0.048	0.370	0.418
Subtotal	0.872	1.754	2.626

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.033	0.108	0.141
Collision with other object	0.003	0.009	0.012
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.057		0.057
Collision with bicycle	0.042		0.042
Subtotal	0.143	0.124	0.267
Total	1.015	1.878	2.893

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.13	0.33	0.45
Crash rate (crashes/mi/year)	1.3	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.074	0.191	0.265
Head-on collision	0.007	0.001	0.008
Angle collision	0.009	0.019	0.028
Sideswipe, same direction	0.002	0.008	0.010
Sideswipe, opposite direction	0.007	0.013	0.020
Other multiple-vehicle collision	0.003	0.013	0.016
Subtotal	0.102	0.245	0.347
Single-Vehicle Collisions			
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.014	0.063	0.077
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.013	0.018
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.023	0.082	0.105
Total	0.125	0.327	0.452

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	1260
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.42	0.63	1.05

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.118	0.207	0.325
Head-on collision	0.014	0.017	0.031
Angle collision	0.153	0.186	0.339
Sideswipe	0.042	0.024	0.066
Other multiple-vehicle collision	0.021	0.120	0.141
Subtotal	0.348	0.554	0.902

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.020	0.064	0.084
Collision with other object	0.003	0.005	0.008
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.005	0.004	0.009
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.018		0.018
Subtotal	0.069	0.076	0.145
Total	0.417	0.630	1.047

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.38	1.01	1.39
Crash rate (crashes/mi/year)	1.3	3.4	4.6

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.220	0.573	0.793
Head-on collision	0.020	0.003	0.023
Angle collision	0.026	0.058	0.084
Sideswipe, same direction	0.005	0.023	0.028
Sideswipe, opposite direction	0.022	0.041	0.063
Other multiple-vehicle collision	0.009	0.039	0.048
Subtotal	0.314	0.763	1.077
Single-Vehicle Collisions			
Collision with animal	0.001	0.016	0.017
Collision with fixed object	0.041	0.188	0.229
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.014	0.040	0.054
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.006		0.006
Subtotal	0.070	0.247	0.317
Total	0.384	1.010	1.394

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	970
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.39	0.60	0.99

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.110	0.195	0.305
Head-on collision	0.013	0.016	0.029
Angle collision	0.143	0.175	0.318
Sideswipe	0.039	0.023	0.062
Other multiple-vehicle collision	0.019	0.113	0.132
Subtotal	0.324	0.522	0.846

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.019	0.062	0.081
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.005	0.004	0.009
Collision with pedestrian	0.021		0.021
Collision with bicycle	0.017		0.017
Subtotal	0.065	0.074	0.139
Total	0.389	0.596	0.985

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	1
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.68	0.93
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.211	0.510	0.721
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.257	0.675	0.932

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	12000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	10
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.37	2.73	4.09

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.551	1.228	1.779
Head-on collision	0.060	0.076	0.136
Angle collision	0.425	0.620	1.045
Sideswipe	0.121	0.081	0.202
Other multiple-vehicle collision	0.067	0.537	0.604
Subtotal	1.224	2.542	3.766

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.052	0.162	0.214
Collision with other object	0.005	0.013	0.018
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.010	0.006	0.016
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.060		0.060
Subtotal	0.143	0.185	0.328
Total	1.367	2.727	4.094

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.94	2.48	3.42
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.561	1.464	2.025
Head-on collision	0.052	0.008	0.060
Angle collision	0.065	0.149	0.214
Sideswipe, same direction	0.012	0.058	0.070
Sideswipe, opposite direction	0.056	0.104	0.160
Other multiple-vehicle collision	0.022	0.100	0.122
Subtotal	0.768	1.883	2.651
Single-Vehicle Collisions			
Collision with animal	0.004	0.039	0.043
Collision with fixed object	0.098	0.454	0.552
Collision with other object	0.001	0.008	0.009
Other single-vehicle collision	0.033	0.097	0.130
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.014		0.014
Subtotal	0.167	0.598	0.765
Total	0.935	2.481	3.416

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	19000
AADTminor	1470
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.49	0.73	1.23

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.140	0.242	0.382
Head-on collision	0.017	0.019	0.036
Angle collision	0.182	0.217	0.399
Sideswipe	0.050	0.029	0.079
Other multiple-vehicle collision	0.025	0.141	0.166
Subtotal	0.414	0.648	1.062
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.071	0.093
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.021		0.021
Subtotal	0.080	0.084	0.164
Total	0.494	0.732	1.226

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.40	1.06	1.47
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.240	0.628	0.868
Head-on collision	0.022	0.003	0.025
Angle collision	0.028	0.064	0.092
Sideswipe, same direction	0.005	0.025	0.030
Sideswipe, opposite direction	0.024	0.044	0.068
Other multiple-vehicle collision	0.010	0.043	0.053
Subtotal	0.329	0.807	1.136
Single-Vehicle Collisions			
Collision with animal	0.002	0.017	0.019
Collision with fixed object	0.042	0.195	0.237
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.014	0.042	0.056
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.006		0.006
Subtotal	0.072	0.257	0.329
Total	0.401	1.064	1.465

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	19000
AADTminor	5020
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.69	0.96	1.65

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.197	0.322	0.519
Head-on collision	0.024	0.026	0.050
Angle collision	0.257	0.288	0.545
Sideswipe	0.071	0.038	0.109
Other multiple-vehicle collision	0.035	0.187	0.222
Subtotal	0.584	0.861	1.445

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.083	0.109
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.028		0.028
Subtotal	0.101	0.099	0.200
Total	0.685	0.960	1.645

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.13	0.35	0.49
Crash rate (crashes/mi/year)	1.3	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.080	0.209	0.289
Head-on collision	0.007	0.001	0.008
Angle collision	0.009	0.021	0.030
Sideswipe, same direction	0.002	0.008	0.010
Sideswipe, opposite direction	0.008	0.015	0.023
Other multiple-vehicle collision	0.003	0.014	0.017
Subtotal	0.109	0.268	0.377
Single-Vehicle Collisions			
Collision with animal	0.000	0.006	0.006
Collision with fixed object	0.014	0.065	0.079
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.014	0.019
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.023	0.086	0.109
Total	0.132	0.354	0.486

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	17500
AADTminor	16000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	20
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.01	2.02	3.03

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.399	0.907	1.306
Head-on collision	0.043	0.056	0.099
Angle collision	0.308	0.458	0.766
Sideswipe	0.088	0.060	0.148
Other multiple-vehicle collision	0.049	0.396	0.445
Subtotal	0.887	1.877	2.764

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.041	0.124	0.165
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.024		0.024
Collision with bicycle	0.044		0.044
Subtotal	0.123	0.142	0.265
Total	1.010	2.019	3.029

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	2500
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive Protected
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	120
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.99	1.88	2.87

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.392	0.847	1.239
Head-on collision	0.043	0.053	0.096
Angle collision	0.303	0.428	0.731
Sideswipe	0.086	0.056	0.142
Other multiple-vehicle collision	0.048	0.370	0.418
Subtotal	0.872	1.754	2.626
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.033	0.108	0.141
Collision with other object	0.003	0.009	0.012
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.031		0.031
Collision with bicycle	0.042		0.042
Subtotal	0.117	0.124	0.241
Total	0.989	1.878	2.867

General Information					
Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data	
Road type	4D
Length of segment, L (mi)	0.1
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results			
Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.10	0.25	0.34
Crash rate (crashes/mi/year)	1.0	2.5	3.4

Crash Severity Distribution			
Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.064	0.128	0.192
Head-on collision	0.002	0.001	0.003
Angle collision	0.003	0.007	0.010
Sideswipe, same direction	0.004	0.043	0.047
Sideswipe, opposite direction	0.001	0.000	0.001
Other multiple-vehicle collision	0.004	0.014	0.018
Subtotal	0.078	0.193	0.271
Single-Vehicle Collisions			
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.006	0.044	0.050
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.006	0.011
Collision with pedestrian	0.006		0.006
Collision with bicycle	0.002		0.002
Subtotal	0.019	0.054	0.073
Total	0.097	0.247	0.344

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	1260
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.42	0.63	1.05

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.118	0.207	0.325
Head-on collision	0.014	0.017	0.031
Angle collision	0.153	0.186	0.339
Sideswipe	0.042	0.024	0.066
Other multiple-vehicle collision	0.021	0.120	0.141
Subtotal	0.348	0.554	0.902
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.020	0.064	0.084
Collision with other object	0.003	0.005	0.008
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.005	0.004	0.009
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.018		0.018
Subtotal	0.069	0.076	0.145
Total	0.417	0.630	1.047

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.3
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.28	0.73	1.02
Crash rate (crashes/mi/year)	0.9	2.4	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.188	0.377	0.565
Head-on collision	0.005	0.004	0.009
Angle collision	0.009	0.021	0.030
Sideswipe, same direction	0.011	0.127	0.138
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.011	0.040	0.051
Subtotal	0.228	0.575	0.803
Single-Vehicle Collisions			
Collision with animal	0.000	0.010	0.010
Collision with fixed object	0.016	0.128	0.144
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.015	0.017	0.032
Collision with pedestrian	0.019		0.019
Collision with bicycle	0.005		0.005
Subtotal	0.056	0.158	0.214
Total	0.284	0.733	1.017

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	970
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.39	0.60	0.99

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.110	0.195	0.305
Head-on collision	0.013	0.016	0.029
Angle collision	0.143	0.175	0.318
Sideswipe	0.039	0.023	0.062
Other multiple-vehicle collision	0.019	0.113	0.132
Subtotal	0.324	0.522	0.846
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.019	0.062	0.081
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.005	0.004	0.009
Collision with pedestrian	0.021		0.021
Collision with bicycle	0.017		0.017
Subtotal	0.065	0.074	0.139
Total	0.389	0.596	0.985

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	1
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.19	0.49	0.68
Crash rate (crashes/mi/year)	1.0	2.5	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.125	0.252	0.377
Head-on collision	0.003	0.003	0.006
Angle collision	0.006	0.014	0.020
Sideswipe, same direction	0.008	0.085	0.093
Sideswipe, opposite direction	0.002	0.000	0.002
Other multiple-vehicle collision	0.007	0.027	0.034
Subtotal	0.153	0.385	0.538
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.011	0.086	0.097
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.010	0.011	0.021
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.003		0.003
Subtotal	0.038	0.106	0.144
Total	0.191	0.491	0.682

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	12000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	10
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.11	2.21	3.32

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.446	0.994	1.440
Head-on collision	0.049	0.062	0.111
Angle collision	0.344	0.502	0.846
Sideswipe	0.098	0.066	0.164
Other multiple-vehicle collision	0.055	0.434	0.489
Subtotal	0.992	2.058	3.050
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.042	0.131	0.173
Collision with other object	0.004	0.011	0.015
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.049		0.049
Subtotal	0.118	0.150	0.268
Total	1.110	2.208	3.318

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.7
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	30
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.69	1.80	2.49
Crash rate (crashes/mi/year)	1.0	2.6	3.6

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.464	0.940	1.404
Head-on collision	0.011	0.010	0.021
Angle collision	0.022	0.051	0.073
Sideswipe, same direction	0.028	0.317	0.345
Sideswipe, opposite direction	0.006	0.001	0.007
Other multiple-vehicle collision	0.027	0.101	0.128
Subtotal	0.558	1.420	1.978
Single-Vehicle Collisions			
Collision with animal	0.000	0.024	0.024
Collision with fixed object	0.038	0.305	0.343
Collision with other object	0.002	0.006	0.008
Other single-vehicle collision	0.035	0.041	0.076
Collision with pedestrian	0.046		0.046
Collision with bicycle	0.012		0.012
Subtotal	0.133	0.376	0.509
Total	0.691	1.796	2.487

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	19000
AADTminor	1470
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.49	0.73	1.23

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.140	0.242	0.382
Head-on collision	0.017	0.019	0.036
Angle collision	0.182	0.217	0.399
Sideswipe	0.050	0.029	0.079
Other multiple-vehicle collision	0.025	0.141	0.166
Subtotal	0.414	0.648	1.062
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.071	0.093
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.021		0.021
Subtotal	0.080	0.084	0.164
Total	0.494	0.732	1.226

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.3
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.78	1.08
Crash rate (crashes/mi/year)	1.0	2.6	3.6

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.201	0.407	0.608
Head-on collision	0.005	0.004	0.009
Angle collision	0.010	0.022	0.032
Sideswipe, same direction	0.012	0.137	0.149
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.012	0.044	0.056
Subtotal	0.242	0.615	0.857
Single-Vehicle Collisions			
Collision with animal	0.000	0.010	0.010
Collision with fixed object	0.017	0.132	0.149
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.016	0.017	0.033
Collision with pedestrian	0.020		0.020
Collision with bicycle	0.005		0.005
Subtotal	0.059	0.162	0.221
Total	0.301	0.777	1.078

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	19000
AADTminor	5020
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.69	0.96	1.65

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.197	0.322	0.519
Head-on collision	0.024	0.026	0.050
Angle collision	0.257	0.288	0.545
Sideswipe	0.071	0.038	0.109
Other multiple-vehicle collision	0.035	0.187	0.222
Subtotal	0.584	0.861	1.445
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.083	0.109
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.028		0.028
Subtotal	0.101	0.099	0.200
Total	0.685	0.960	1.645

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.1
AADT (veh/day)	19000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.10	0.26	0.36
Crash rate (crashes/mi/year)	1.0	2.6	3.6

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.067	0.136	0.203
Head-on collision	0.002	0.001	0.003
Angle collision	0.003	0.007	0.010
Sideswipe, same direction	0.004	0.046	0.050
Sideswipe, opposite direction	0.001	0.000	0.001
Other multiple-vehicle collision	0.004	0.015	0.019
Subtotal	0.081	0.205	0.286
Single-Vehicle Collisions			
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.006	0.044	0.050
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.006	0.011
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.002		0.002
Subtotal	0.020	0.054	0.074
Total	0.101	0.259	0.360

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	17500
AADTminor	16000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	20
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.01	2.02	3.03

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.399	0.907	1.306
Head-on collision	0.043	0.056	0.099
Angle collision	0.308	0.458	0.766
Sideswipe	0.088	0.060	0.148
Other multiple-vehicle collision	0.049	0.396	0.445
Subtotal	0.887	1.877	2.764
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.041	0.124	0.165
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.024		0.024
Collision with bicycle	0.044		0.044
Subtotal	0.123	0.142	0.265
Total	1.010	2.019	3.029

**NORTH SECTION - ALL BUILD VOLUMES
US 18/ SUMMIT AVENUE TO ROLLING RIDGE DRIVE**

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	25000
AADTminor	3160
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	400
Maximum number of lanes crossed by a pedestrian	5
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.44	2.62	4.06

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.569	1.185	1.754
Head-on collision	0.062	0.074	0.136
Angle collision	0.439	0.599	1.038
Sideswipe	0.125	0.079	0.204
Other multiple-vehicle collision	0.070	0.518	0.588
Subtotal	1.265	2.455	3.720

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.039	0.142	0.181
Collision with other object	0.004	0.011	0.015
Other single-vehicle collision	0.002	0.004	0.006
Single-vehicle noncollision	0.007	0.006	0.013
Collision with pedestrian	0.062		0.062
Collision with bicycle	0.059		0.059
Subtotal	0.173	0.163	0.336
Total	1.438	2.618	4.056

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	24000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.19	0.50	0.69
Crash rate (crashes/mi/year)	1.9	5.0	6.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.118	0.310	0.428
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.162	0.399	0.561
Single-Vehicle Collisions			
Collision with animal	0.001	0.007	0.008
Collision with fixed object	0.014	0.075	0.089
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.016	0.021
Collision with pedestrian	0.003		0.003
Collision with bicycle	0.003		0.003
Subtotal	0.026	0.099	0.125
Total	0.188	0.498	0.686

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	24000
AADTminor	1590
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.57	0.81	1.38

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.163	0.272	0.435
Head-on collision	0.020	0.022	0.042
Angle collision	0.213	0.244	0.457
Sideswipe	0.058	0.032	0.090
Other multiple-vehicle collision	0.029	0.158	0.187
Subtotal	0.483	0.728	1.211
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.072	0.094
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.029		0.029
Collision with bicycle	0.024		0.024
Subtotal	0.086	0.085	0.171
Total	0.569	0.813	1.382

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	24000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.58	1.53	2.11
Crash rate (crashes/mi/year)	1.9	5.1	7.0

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.355	0.930	1.285
Head-on collision	0.033	0.005	0.038
Angle collision	0.041	0.094	0.135
Sideswipe, same direction	0.007	0.037	0.044
Sideswipe, opposite direction	0.035	0.066	0.101
Other multiple-vehicle collision	0.014	0.063	0.077
Subtotal	0.501	1.230	1.731
Single-Vehicle Collisions			
Collision with animal	0.002	0.020	0.022
Collision with fixed object	0.044	0.225	0.269
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.048	0.063
Collision with pedestrian	0.010		0.010
Collision with bicycle	0.008		0.008
Subtotal	0.080	0.297	0.377
Total	0.581	1.527	2.108

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	24000
AADTminor	1230
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.53	0.77	1.30

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.152	0.257	0.409
Head-on collision	0.018	0.021	0.039
Angle collision	0.198	0.230	0.428
Sideswipe	0.054	0.030	0.084
Other multiple-vehicle collision	0.027	0.149	0.176
Subtotal	0.449	0.687	1.136
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.069	0.091
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.027		0.027
Collision with bicycle	0.023		0.023
Subtotal	0.083	0.082	0.165
Total	0.532	0.769	1.301

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	24000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	1
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.39	1.02	1.41
Crash rate (crashes/mi/year)	1.9	5.1	7.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.236	0.622	0.858
Head-on collision	0.022	0.003	0.025
Angle collision	0.027	0.063	0.090
Sideswipe, same direction	0.005	0.025	0.030
Sideswipe, opposite direction	0.024	0.044	0.068
Other multiple-vehicle collision	0.009	0.042	0.051
Subtotal	0.335	0.824	1.159
Single-Vehicle Collisions			
Collision with animal	0.001	0.013	0.014
Collision with fixed object	0.030	0.150	0.180
Collision with other object	0.000	0.003	0.003
Other single-vehicle collision	0.010	0.032	0.042
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.006		0.006
Subtotal	0.054	0.198	0.252
Total	0.389	1.022	1.411

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	23000
AADTminor	11000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	10
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.66	3.24	4.90

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.677	1.462	2.139
Head-on collision	0.074	0.091	0.165
Angle collision	0.522	0.739	1.261
Sideswipe	0.149	0.097	0.246
Other multiple-vehicle collision	0.083	0.639	0.722
Subtotal	1.505	3.028	4.533

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.054	0.184	0.238
Collision with other object	0.005	0.015	0.020
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.010	0.007	0.017
Collision with pedestrian	0.012		0.012
Collision with bicycle	0.072		0.072
Subtotal	0.156	0.211	0.367
Total	1.661	3.239	4.900

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.16	3.07	4.23
Crash rate (crashes/mi/year)	1.7	4.4	6.0

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.715	1.877	2.592
Head-on collision	0.067	0.010	0.077
Angle collision	0.083	0.191	0.274
Sideswipe, same direction	0.015	0.075	0.090
Sideswipe, opposite direction	0.072	0.133	0.205
Other multiple-vehicle collision	0.028	0.128	0.156
Subtotal	0.980	2.414	3.394
Single-Vehicle Collisions			
Collision with animal	0.004	0.043	0.047
Collision with fixed object	0.100	0.499	0.599
Collision with other object	0.001	0.009	0.010
Other single-vehicle collision	0.033	0.107	0.140
Collision with pedestrian	0.021		0.021
Collision with bicycle	0.017		0.017
Subtotal	0.176	0.658	0.834
Total	1.156	3.072	4.228

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	22000
AADTminor	1860
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.60	0.86	1.45

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.171	0.286	0.457
Head-on collision	0.021	0.023	0.044
Angle collision	0.223	0.256	0.479
Sideswipe	0.061	0.034	0.095
Other multiple-vehicle collision	0.030	0.166	0.196
Subtotal	0.506	0.765	1.271
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.024	0.077	0.101
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.031		0.031
Collision with bicycle	0.025		0.025
Subtotal	0.091	0.090	0.181
Total	0.597	0.855	1.452

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.50	1.32	1.81
Crash rate (crashes/mi/year)	1.7	4.4	6.0

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.307	0.804	1.111
Head-on collision	0.029	0.004	0.033
Angle collision	0.036	0.082	0.118
Sideswipe, same direction	0.006	0.032	0.038
Sideswipe, opposite direction	0.031	0.057	0.088
Other multiple-vehicle collision	0.012	0.055	0.067
Subtotal	0.421	1.034	1.455
Single-Vehicle Collisions			
Collision with animal	0.002	0.019	0.021
Collision with fixed object	0.043	0.213	0.256
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.014	0.046	0.060
Collision with pedestrian	0.009		0.009
Collision with bicycle	0.007		0.007
Subtotal	0.076	0.282	0.358
Total	0.497	1.316	1.813

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	22000
AADTminor	6340
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.83	1.12	1.95

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.241	0.379	0.620
Head-on collision	0.029	0.030	0.059
Angle collision	0.314	0.340	0.654
Sideswipe	0.086	0.045	0.131
Other multiple-vehicle collision	0.043	0.220	0.263
Subtotal	0.713	1.014	1.727
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.028	0.089	0.117
Collision with other object	0.004	0.007	0.011
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.041		0.041
Collision with bicycle	0.034		0.034
Subtotal	0.116	0.105	0.221
Total	0.829	1.119	1.948

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.17	0.44	0.60
Crash rate (crashes/mi/year)	1.7	4.4	6.0

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.102	0.268	0.370
Head-on collision	0.010	0.001	0.011
Angle collision	0.012	0.027	0.039
Sideswipe, same direction	0.002	0.011	0.013
Sideswipe, opposite direction	0.010	0.019	0.029
Other multiple-vehicle collision	0.004	0.018	0.022
Subtotal	0.140	0.344	0.484
Single-Vehicle Collisions			
Collision with animal	0.001	0.006	0.007
Collision with fixed object	0.014	0.071	0.085
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.015	0.020
Collision with pedestrian	0.003		0.003
Collision with bicycle	0.002		0.002
Subtotal	0.025	0.093	0.118
Total	0.165	0.437	0.602

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction	Analysis Date	6/24/2011 2:08 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	20000
AADTminor	14000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	20
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.14	2.24	3.37

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.454	1.007	1.461
Head-on collision	0.049	0.063	0.112
Angle collision	0.350	0.509	0.859
Sideswipe	0.100	0.067	0.167
Other multiple-vehicle collision	0.055	0.440	0.495
Subtotal	1.008	2.086	3.094

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.042	0.132	0.174
Collision with other object	0.004	0.011	0.015
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.021		0.021
Collision with bicycle	0.050		0.050
Subtotal	0.127	0.151	0.278
Total	1.135	2.237	3.372

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	29000
AADTminor	3680
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	120
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.72	3.15	4.87

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.701	1.428	2.129
Head-on collision	0.076	0.089	0.165
Angle collision	0.540	0.722	1.262
Sideswipe	0.154	0.095	0.249
Other multiple-vehicle collision	0.086	0.624	0.710
Subtotal	1.557	2.958	4.515
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.043	0.165	0.208
Collision with other object	0.004	0.013	0.017
Other single-vehicle collision	0.002	0.004	0.006
Single-vehicle noncollision	0.008	0.006	0.014
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.071		0.071
Subtotal	0.163	0.188	0.351
Total	1.720	3.146	4.866

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.1
AADT (veh/day)	28000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.16	0.41	0.58
Crash rate (crashes/mi/year)	1.6	4.1	5.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.111	0.232	0.343
Head-on collision	0.003	0.002	0.005
Angle collision	0.005	0.013	0.018
Sideswipe, same direction	0.007	0.078	0.085
Sideswipe, opposite direction	0.001	0.000	0.001
Other multiple-vehicle collision	0.006	0.025	0.031
Subtotal	0.133	0.350	0.483
Single-Vehicle Collisions			
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.007	0.052	0.059
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.007	0.007	0.014
Collision with pedestrian	0.011		0.011
Collision with bicycle	0.003		0.003
Subtotal	0.028	0.064	0.092
Total	0.161	0.414	0.575

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	28000
AADTminor	1860
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.68	0.94	1.62

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.197	0.317	0.514
Head-on collision	0.024	0.025	0.049
Angle collision	0.256	0.284	0.540
Sideswipe	0.070	0.037	0.107
Other multiple-vehicle collision	0.035	0.184	0.219
Subtotal	0.582	0.847	1.429
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.024	0.077	0.101
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.034		0.034
Collision with bicycle	0.028		0.028
Subtotal	0.097	0.090	0.187
Total	0.679	0.937	1.616

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.3
AADT (veh/day)	28000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.49	1.27	1.76
Crash rate (crashes/mi/year)	1.6	4.2	5.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.334	0.704	1.038
Head-on collision	0.008	0.007	0.015
Angle collision	0.016	0.038	0.054
Sideswipe, same direction	0.020	0.237	0.257
Sideswipe, opposite direction	0.004	0.001	0.005
Other multiple-vehicle collision	0.019	0.076	0.095
Subtotal	0.404	1.072	1.476
Single-Vehicle Collisions			
Collision with animal	0.000	0.012	0.012
Collision with fixed object	0.022	0.158	0.180
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.020	0.021	0.041
Collision with pedestrian	0.033		0.033
Collision with bicycle	0.009		0.009
Subtotal	0.085	0.194	0.279
Total	0.489	1.266	1.755

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	28000
AADTminor	1430
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.63	0.89	1.52

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.183	0.298	0.481
Head-on collision	0.022	0.024	0.046
Angle collision	0.238	0.267	0.505
Sideswipe	0.065	0.035	0.100
Other multiple-vehicle collision	0.032	0.173	0.205
Subtotal	0.540	0.797	1.337
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.023	0.075	0.098
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.032		0.032
Collision with bicycle	0.026		0.026
Subtotal	0.092	0.088	0.180
Total	0.632	0.885	1.517

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	28000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	1
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.32	0.84	1.16
Crash rate (crashes/mi/year)	1.6	4.2	5.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.220	0.465	0.685
Head-on collision	0.005	0.005	0.010
Angle collision	0.011	0.025	0.036
Sideswipe, same direction	0.013	0.157	0.170
Sideswipe, opposite direction	0.003	0.001	0.004
Other multiple-vehicle collision	0.013	0.050	0.063
Subtotal	0.268	0.710	0.978
Single-Vehicle Collisions			
Collision with animal	0.000	0.008	0.008
Collision with fixed object	0.014	0.105	0.119
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.013	0.014	0.027
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.006		0.006
Subtotal	0.056	0.129	0.185
Total	0.324	0.839	1.163

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	27000
AADTminor	11000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	10
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.62	3.07	4.69

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.662	1.391	2.053
Head-on collision	0.072	0.086	0.158
Angle collision	0.510	0.703	1.213
Sideswipe	0.146	0.092	0.238
Other multiple-vehicle collision	0.081	0.608	0.689
Subtotal	1.471	2.880	4.351

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.048	0.169	0.217
Collision with other object	0.005	0.014	0.019
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.009	0.007	0.016
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.069		0.069
Subtotal	0.147	0.194	0.341
Total	1.618	3.074	4.692

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.7
AADT (veh/day)	26000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	30
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.02	2.62	3.64
Crash rate (crashes/mi/year)	1.5	3.7	5.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.696	1.452	2.148
Head-on collision	0.017	0.015	0.032
Angle collision	0.033	0.079	0.112
Sideswipe, same direction	0.042	0.489	0.531
Sideswipe, opposite direction	0.008	0.002	0.010
Other multiple-vehicle collision	0.040	0.156	0.196
Subtotal	0.836	2.193	3.029
Single-Vehicle Collisions			
Collision with animal	0.000	0.027	0.027
Collision with fixed object	0.047	0.349	0.396
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.044	0.046	0.090
Collision with pedestrian	0.067		0.067
Collision with bicycle	0.018		0.018
Subtotal	0.179	0.429	0.608
Total	1.015	2.622	3.637

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	26000
AADTminor	2170
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.72	1.00	1.72

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.208	0.337	0.545
Head-on collision	0.025	0.027	0.052
Angle collision	0.271	0.302	0.573
Sideswipe	0.074	0.040	0.114
Other multiple-vehicle collision	0.037	0.195	0.232
Subtotal	0.615	0.901	1.516
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.083	0.109
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.030		0.030
Subtotal	0.104	0.099	0.203
Total	0.719	1.000	1.719

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.3
AADT (veh/day)	26000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.44	1.14	1.57
Crash rate (crashes/mi/year)	1.5	3.8	5.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.301	0.628	0.929
Head-on collision	0.007	0.007	0.014
Angle collision	0.014	0.034	0.048
Sideswipe, same direction	0.018	0.212	0.230
Sideswipe, opposite direction	0.004	0.001	0.005
Other multiple-vehicle collision	0.017	0.067	0.084
Subtotal	0.361	0.949	1.310
Single-Vehicle Collisions			
Collision with animal	0.000	0.012	0.012
Collision with fixed object	0.021	0.151	0.172
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.019	0.020	0.039
Collision with pedestrian	0.029		0.029
Collision with bicycle	0.008		0.008
Subtotal	0.078	0.186	0.264
Total	0.439	1.135	1.574

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	26000
AADTminor	7400
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.00	1.30	2.30

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.293	0.445	0.738
Head-on collision	0.036	0.036	0.072
Angle collision	0.381	0.399	0.780
Sideswipe	0.105	0.052	0.157
Other multiple-vehicle collision	0.052	0.258	0.310
Subtotal	0.867	1.190	2.057
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.030	0.096	0.126
Collision with other object	0.004	0.008	0.012
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.008	0.006	0.014
Collision with pedestrian	0.049		0.049
Collision with bicycle	0.040		0.040
Subtotal	0.133	0.114	0.247
Total	1.000	1.304	2.304

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.1
AADT (veh/day)	26000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.15	0.38	0.53
Crash rate (crashes/mi/year)	1.5	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.101	0.210	0.311
Head-on collision	0.002	0.002	0.004
Angle collision	0.005	0.011	0.016
Sideswipe, same direction	0.006	0.071	0.077
Sideswipe, opposite direction	0.001	0.000	0.001
Other multiple-vehicle collision	0.006	0.023	0.029
Subtotal	0.121	0.317	0.438
Single-Vehicle Collisions			
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.007	0.050	0.057
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.007	0.007	0.014
Collision with pedestrian	0.010		0.010
Collision with bicycle	0.003		0.003
Subtotal	0.027	0.062	0.089
Total	0.148	0.379	0.527

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on County TT alignment alternative	Analysis Date	6/24/2011 11:05 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	North Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	24750
AADTminor	14000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	20
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.44	2.77	4.21

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.584	1.250	1.834
Head-on collision	0.064	0.078	0.142
Angle collision	0.450	0.631	1.081
Sideswipe	0.128	0.083	0.211
Other multiple-vehicle collision	0.071	0.546	0.617
Subtotal	1.297	2.588	3.885
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.046	0.156	0.202
Collision with other object	0.004	0.013	0.017
Other single-vehicle collision	0.002	0.004	0.006
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.021		0.021
Collision with bicycle	0.062		0.062
Subtotal	0.144	0.179	0.323
Total	1.441	2.767	4.208

CENTER SECTION
WISCONSIN SOUTHERN RAILROAD/GLACIAL DRUMLIN TRAIL TO US 18

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	27
Offset to roadside fixed objects (ft)	13
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.22	0.59	0.81
Crash rate (crashes/mi/year)	1.1	2.9	4.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.128	0.332	0.460
Head-on collision	0.012	0.002	0.014
Angle collision	0.015	0.034	0.049
Sideswipe, same direction	0.003	0.013	0.016
Sideswipe, opposite direction	0.013	0.023	0.036
Other multiple-vehicle collision	0.005	0.023	0.028
Subtotal	0.176	0.427	0.603
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.028	0.123	0.151
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.026	0.035
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.045	0.162	0.207
Total	0.221	0.589	0.810

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	16000
AADTminor	1030
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.67	1.03	1.70

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.186	0.337	0.523
Head-on collision	0.023	0.027	0.050
Angle collision	0.242	0.302	0.544
Sideswipe	0.067	0.040	0.107
Other multiple-vehicle collision	0.033	0.195	0.228
Subtotal	0.551	0.901	1.452
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.035	0.111	0.146
Collision with other object	0.005	0.009	0.014
Other single-vehicle collision	0.003	0.001	0.004
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.029		0.029
Subtotal	0.117	0.130	0.247
Total	0.668	1.031	1.699

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	90
Offset to roadside fixed objects (ft)	11
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.35	0.90	1.25
Crash rate (crashes/mi/year)	1.8	4.5	6.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.166	0.433	0.599
Head-on collision	0.016	0.002	0.018
Angle collision	0.019	0.044	0.063
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.017	0.031	0.048
Other multiple-vehicle collision	0.007	0.029	0.036
Subtotal	0.290	0.687	0.977
Single-Vehicle Collisions			
Collision with animal	0.001	0.014	0.015
Collision with fixed object	0.037	0.160	0.197
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.012	0.034	0.046
Collision with pedestrian	0.006		0.006
Collision with bicycle	0.005		0.005
Subtotal	0.062	0.211	0.273
Total	0.352	0.898	1.250

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	16000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.36	0.64

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.096	0.138	0.234
Head-on collision	0.010	0.007	0.017
Angle collision	0.078	0.082	0.160
Sideswipe	0.029	0.013	0.042
Other multiple-vehicle collision	0.015	0.074	0.089
Subtotal	0.228	0.314	0.542
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.017	0.041	0.058
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.001	0.003
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.010		0.010
Subtotal	0.045	0.049	0.094
Total	0.273	0.363	0.636

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	47
Offset to roadside fixed objects (ft)	16
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.23	0.62	0.86
Crash rate (crashes/mi/year)	1.2	3.1	4.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.135	0.351	0.486
Head-on collision	0.013	0.002	0.015
Angle collision	0.016	0.036	0.052
Sideswipe, same direction	0.003	0.014	0.017
Sideswipe, opposite direction	0.014	0.025	0.039
Other multiple-vehicle collision	0.005	0.024	0.029
Subtotal	0.186	0.452	0.638
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.030	0.130	0.160
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.010	0.028	0.038
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.048	0.171	0.219
Total	0.234	0.623	0.857

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	15500
AADTminor	6000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.14	1.63	2.78

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.327	0.545	0.872
Head-on collision	0.040	0.044	0.084
Angle collision	0.425	0.488	0.913
Sideswipe	0.117	0.064	0.181
Other multiple-vehicle collision	0.058	0.316	0.374
Subtotal	0.967	1.457	2.424
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.047	0.150	0.197
Collision with other object	0.006	0.012	0.018
Other single-vehicle collision	0.004	0.001	0.005
Single-vehicle noncollision	0.012	0.009	0.021
Collision with pedestrian	0.059		0.059
Collision with bicycle	0.048		0.048
Subtotal	0.176	0.177	0.353
Total	1.143	1.634	2.777

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	61
Offset to roadside fixed objects (ft)	10
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.37	0.97	1.33
Crash rate (crashes/mi/year)	1.2	3.2	4.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.203	0.527	0.730
Head-on collision	0.019	0.003	0.022
Angle collision	0.024	0.054	0.078
Sideswipe, same direction	0.004	0.021	0.025
Sideswipe, opposite direction	0.020	0.037	0.057
Other multiple-vehicle collision	0.008	0.036	0.044
Subtotal	0.284	0.692	0.976
Single-Vehicle Collisions			
Collision with animal	0.002	0.018	0.020
Collision with fixed object	0.050	0.209	0.259
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.017	0.045	0.062
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.005		0.005
Subtotal	0.082	0.276	0.358
Total	0.366	0.968	1.334

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	15000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.44	0.77	1.20

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.116	0.240	0.356
Head-on collision	0.014	0.019	0.033
Angle collision	0.151	0.215	0.366
Sideswipe	0.042	0.028	0.070
Other multiple-vehicle collision	0.021	0.139	0.160
Subtotal	0.344	0.641	0.985
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.033	0.106	0.139
Collision with other object	0.004	0.009	0.013
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.021		0.021
Subtotal	0.094	0.125	0.219
Total	0.438	0.766	1.204

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	6
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	52
Offset to roadside fixed objects (ft)	10
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.39	1.00	1.39
Crash rate (crashes/mi/year)	1.3	3.3	4.6

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.196	0.510	0.706
Head-on collision	0.018	0.003	0.021
Angle collision	0.023	0.052	0.075
Sideswipe, same direction	0.004	0.020	0.024
Sideswipe, opposite direction	0.020	0.036	0.056
Other multiple-vehicle collision	0.008	0.035	0.043
Subtotal	0.307	0.735	1.041
Single-Vehicle Collisions			
Collision with animal	0.002	0.018	0.020
Collision with fixed object	0.048	0.203	0.251
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.016	0.043	0.059
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.005		0.005
Subtotal	0.079	0.267	0.346
Total	0.386	1.002	1.387

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	15000
AADTminor	1860
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.58	0.97	1.54

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.192	0.364	0.556
Head-on collision	0.021	0.019	0.040
Angle collision	0.156	0.217	0.373
Sideswipe	0.057	0.033	0.090
Other multiple-vehicle collision	0.030	0.194	0.224
Subtotal	0.456	0.827	1.283
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.049	0.118	0.167
Collision with other object	0.006	0.013	0.019
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.007	0.004	0.011
Collision with pedestrian	0.031		0.031
Collision with bicycle	0.024		0.024
Subtotal	0.119	0.141	0.260
Total	0.575	0.968	1.543

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	68
Offset to roadside fixed objects (ft)	9
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.68	0.93
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.145	0.373	0.518
Head-on collision	0.013	0.002	0.015
Angle collision	0.017	0.038	0.055
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.014	0.026	0.040
Other multiple-vehicle collision	0.006	0.025	0.031
Subtotal	0.198	0.479	0.677
Single-Vehicle Collisions			
Collision with animal	0.001	0.013	0.014
Collision with fixed object	0.035	0.149	0.184
Collision with other object	0.000	0.003	0.003
Other single-vehicle collision	0.012	0.032	0.044
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.057	0.197	0.254
Total	0.255	0.676	0.931

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	15000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.51	0.89	1.40

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.135	0.279	0.414
Head-on collision	0.016	0.022	0.038
Angle collision	0.176	0.250	0.426
Sideswipe	0.048	0.033	0.081
Other multiple-vehicle collision	0.024	0.162	0.186
Subtotal	0.399	0.746	1.145
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.038	0.123	0.161
Collision with other object	0.005	0.010	0.015
Other single-vehicle collision	0.003	0.001	0.004
Single-vehicle noncollision	0.010	0.007	0.017
Collision with pedestrian	0.030		0.030
Collision with bicycle	0.024		0.024
Subtotal	0.110	0.145	0.255
Total	0.509	0.891	1.400

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	5
Other driveways	1
Speed Category	31
Roadside fixed object density (fixed objects/mi)	79
Offset to roadside fixed objects (ft)	12
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.76	1.06
Crash rate (crashes/mi/year)	1.5	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.142	0.367	0.509
Head-on collision	0.013	0.002	0.015
Angle collision	0.017	0.037	0.054
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.014	0.026	0.040
Other multiple-vehicle collision	0.006	0.025	0.031
Subtotal	0.240	0.565	0.805
Single-Vehicle Collisions			
Collision with animal	0.001	0.013	0.014
Collision with fixed object	0.035	0.146	0.181
Collision with other object	0.000	0.003	0.003
Other single-vehicle collision	0.012	0.031	0.043
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.057	0.193	0.250
Total	0.297	0.758	1.055

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	15000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.26	0.52

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.096	0.098	0.194
Head-on collision	0.010	0.005	0.015
Angle collision	0.078	0.058	0.136
Sideswipe	0.029	0.009	0.038
Other multiple-vehicle collision	0.015	0.052	0.067
Subtotal	0.228	0.222	0.450
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.013	0.031	0.044
Collision with other object	0.002	0.003	0.005
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.001	0.003
Collision with pedestrian	0.011		0.011
Collision with bicycle	0.008		0.008
Subtotal	0.037	0.037	0.074
Total	0.265	0.259	0.524

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	100
Offset to roadside fixed objects (ft)	10
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.15	0.40	0.55
Crash rate (crashes/mi/year)	1.5	4.0	5.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.078	0.204	0.282
Head-on collision	0.007	0.001	0.008
Angle collision	0.009	0.021	0.030
Sideswipe, same direction	0.002	0.008	0.010
Sideswipe, opposite direction	0.008	0.014	0.022
Other multiple-vehicle collision	0.003	0.014	0.017
Subtotal	0.121	0.294	0.415
Single-Vehicle Collisions			
Collision with animal	0.001	0.007	0.008
Collision with fixed object	0.019	0.081	0.100
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.006	0.017	0.023
Collision with pedestrian	0.003		0.003
Collision with bicycle	0.002		0.002
Subtotal	0.031	0.106	0.137
Total	0.152	0.400	0.552

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	14000
AADTminor	5000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.86	1.70	2.56

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.629	0.900
Head-on collision	0.029	0.033	0.062
Angle collision	0.221	0.375	0.596
Sideswipe	0.081	0.057	0.138
Other multiple-vehicle collision	0.042	0.336	0.378
Subtotal	0.644	1.430	2.074
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.001	0.001
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.092	0.225	0.317
Collision with other object	0.011	0.025	0.036
Other single-vehicle collision	0.005	0.006	0.011
Single-vehicle noncollision	0.013	0.008	0.021
Collision with pedestrian	0.052		0.052
Collision with bicycle	0.039		0.039
Subtotal	0.212	0.270	0.482
Total	0.856	1.700	2.556

General Information

Analyst	Matt Tronnes	Analysis Name	No Build	Analysis Date	6/28/2011 11:36 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	4
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	55
Offset to roadside fixed objects (ft)	13
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.54	0.75
Crash rate (crashes/mi/year)	1.0	2.7	3.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.101	0.262	0.363
Head-on collision	0.009	0.001	0.010
Angle collision	0.012	0.027	0.039
Sideswipe, same direction	0.002	0.010	0.012
Sideswipe, opposite direction	0.010	0.019	0.029
Other multiple-vehicle collision	0.004	0.018	0.022
Subtotal	0.159	0.381	0.540
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.031	0.121	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.010	0.026	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.049	0.159	0.208
Total	0.208	0.540	0.748

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.90
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.202	0.491	0.693
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.165	0.210
Total	0.247	0.656	0.903

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	1160
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.56	0.84	1.40

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.157	0.277	0.434
Head-on collision	0.019	0.022	0.041
Angle collision	0.204	0.248	0.452
Sideswipe	0.056	0.033	0.089
Other multiple-vehicle collision	0.028	0.161	0.189
Subtotal	0.464	0.741	1.205
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.086	0.112
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.030		0.030
Collision with bicycle	0.024		0.024
Subtotal	0.092	0.102	0.194
Total	0.556	0.843	1.399

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.76	1.06
Crash rate (crashes/mi/year)	1.5	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.253	0.598	0.851
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.299	0.763	1.062

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	560
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.32	0.43	0.75

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.112	0.167	0.279
Head-on collision	0.012	0.009	0.021
Angle collision	0.092	0.100	0.192
Sideswipe	0.034	0.015	0.049
Other multiple-vehicle collision	0.017	0.089	0.106
Subtotal	0.267	0.380	0.647

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.018	0.044	0.062
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.003	0.002	0.005
Collision with pedestrian	0.015		0.015
Collision with bicycle	0.012		0.012
Subtotal	0.051	0.053	0.104
Total	0.318	0.433	0.751

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.90
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.202	0.491	0.693
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.165	0.210
Total	0.247	0.656	0.903

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	17500
AADTminor	5000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.84	1.65	2.49

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.335	0.743	1.078
Head-on collision	0.036	0.046	0.082
Angle collision	0.258	0.375	0.633
Sideswipe	0.074	0.049	0.123
Other multiple-vehicle collision	0.041	0.325	0.366
Subtotal	0.744	1.538	2.282
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.031	0.098	0.129
Collision with other object	0.003	0.008	0.011
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.019		0.019
Collision with bicycle	0.037		0.037
Subtotal	0.098	0.113	0.211
Total	0.842	1.651	2.493

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.6
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.70	1.84	2.54
Crash rate (crashes/mi/year)	1.2	3.1	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.401	1.039	1.440
Head-on collision	0.037	0.005	0.042
Angle collision	0.047	0.106	0.153
Sideswipe, same direction	0.008	0.041	0.049
Sideswipe, opposite direction	0.040	0.073	0.113
Other multiple-vehicle collision	0.016	0.071	0.087
Subtotal	0.561	1.359	1.920
Single-Vehicle Collisions			
Collision with animal	0.003	0.032	0.035
Collision with fixed object	0.081	0.364	0.445
Collision with other object	0.001	0.006	0.007
Other single-vehicle collision	0.027	0.078	0.105
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.010		0.010
Subtotal	0.135	0.480	0.615
Total	0.696	1.839	2.535

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	17000
AADTminor	2100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.45	0.79	1.24

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.153	0.300	0.453
Head-on collision	0.016	0.016	0.032
Angle collision	0.125	0.179	0.304
Sideswipe	0.046	0.027	0.073
Other multiple-vehicle collision	0.024	0.160	0.184
Subtotal	0.364	0.682	1.046

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.035	0.087	0.122
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.005	0.003	0.008
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.019		0.019
Subtotal	0.090	0.104	0.194
Total	0.454	0.786	1.240

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.80	2.12	2.92
Crash rate (crashes/mi/year)	1.1	3.0	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.467	1.213	1.680
Head-on collision	0.044	0.006	0.050
Angle collision	0.054	0.123	0.177
Sideswipe, same direction	0.010	0.048	0.058
Sideswipe, opposite direction	0.047	0.086	0.133
Other multiple-vehicle collision	0.019	0.083	0.102
Subtotal	0.641	1.559	2.200
Single-Vehicle Collisions			
Collision with animal	0.003	0.037	0.040
Collision with fixed object	0.095	0.424	0.519
Collision with other object	0.001	0.007	0.008
Other single-vehicle collision	0.032	0.090	0.122
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.012		0.012
Subtotal	0.157	0.558	0.715
Total	0.798	2.117	2.915

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	16500
AADTminor	5900
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.61	1.26	1.86

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.196	0.475	0.671
Head-on collision	0.021	0.025	0.046
Angle collision	0.159	0.283	0.442
Sideswipe	0.059	0.043	0.102
Other multiple-vehicle collision	0.030	0.254	0.284
Subtotal	0.465	1.080	1.545
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.001	0.001
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.059	0.146	0.205
Collision with other object	0.007	0.016	0.023
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.038		0.038
Collision with bicycle	0.029		0.029
Subtotal	0.144	0.175	0.319
Total	0.609	1.255	1.864

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.56	0.76
Crash rate (crashes/mi/year)	1.0	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.120	0.314	0.434
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.164	0.403	0.567
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.116	0.143
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.025	0.034
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.153	0.197
Total	0.208	0.556	0.764

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.56	0.76
Crash rate (crashes/mi/year)	1.0	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.120	0.314	0.434
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.164	0.403	0.567
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.116	0.143
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.025	0.034
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.153	0.197
Total	0.208	0.556	0.764

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	16000
AADTminor	1030
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.49	0.76	1.24

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.136	0.246	0.382
Head-on collision	0.016	0.020	0.036
Angle collision	0.177	0.221	0.398
Sideswipe	0.049	0.029	0.078
Other multiple-vehicle collision	0.024	0.143	0.167
Subtotal	0.402	0.659	1.061

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.025	0.081	0.106
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.021		0.021
Subtotal	0.084	0.096	0.180
Total	0.486	0.755	1.241

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.65	0.91
Crash rate (crashes/mi/year)	1.3	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.120	0.314	0.434
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.209	0.498	0.707
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.116	0.143
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.025	0.034
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.153	0.198
Total	0.254	0.651	0.905

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	16000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.36	0.64

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.096	0.138	0.234
Head-on collision	0.010	0.007	0.017
Angle collision	0.078	0.082	0.160
Sideswipe	0.029	0.013	0.042
Other multiple-vehicle collision	0.015	0.074	0.089
Subtotal	0.228	0.314	0.542
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.017	0.041	0.058
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.001	0.003
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.010		0.010
Subtotal	0.045	0.049	0.094
Total	0.273	0.363	0.636

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.56	0.76
Crash rate (crashes/mi/year)	1.0	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.120	0.314	0.434
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.164	0.403	0.567
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.116	0.143
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.025	0.034
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.153	0.197
Total	0.208	0.556	0.764

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	15500
AADTminor	6000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.77	1.53	2.29

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.302	0.685	0.987
Head-on collision	0.033	0.043	0.076
Angle collision	0.233	0.346	0.579
Sideswipe	0.066	0.045	0.111
Other multiple-vehicle collision	0.037	0.299	0.336
Subtotal	0.671	1.418	2.089
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.031	0.094	0.125
Collision with other object	0.003	0.008	0.011
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.020		0.020
Collision with bicycle	0.034		0.034
Subtotal	0.096	0.108	0.204
Total	0.767	1.526	2.293

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.29	0.78	1.07
Crash rate (crashes/mi/year)	1.0	2.6	3.6

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.422	0.584
Head-on collision	0.015	0.002	0.017
Angle collision	0.019	0.043	0.062
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.016	0.030	0.046
Other multiple-vehicle collision	0.006	0.029	0.035
Subtotal	0.226	0.554	0.780
Single-Vehicle Collisions			
Collision with animal	0.001	0.015	0.016
Collision with fixed object	0.040	0.168	0.208
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.013	0.036	0.049
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.064	0.222	0.286
Total	0.290	0.776	1.066

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	15000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.44	0.77	1.20

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.116	0.240	0.356
Head-on collision	0.014	0.019	0.033
Angle collision	0.151	0.215	0.366
Sideswipe	0.042	0.028	0.070
Other multiple-vehicle collision	0.021	0.139	0.160
Subtotal	0.344	0.641	0.985
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.033	0.106	0.139
Collision with other object	0.004	0.009	0.013
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.021		0.021
Subtotal	0.094	0.125	0.219
Total	0.438	0.766	1.204

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	6
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.32	0.83	1.15
Crash rate (crashes/mi/year)	1.1	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.422	0.584
Head-on collision	0.015	0.002	0.017
Angle collision	0.019	0.043	0.062
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.016	0.030	0.046
Other multiple-vehicle collision	0.006	0.029	0.035
Subtotal	0.252	0.608	0.860
Single-Vehicle Collisions			
Collision with animal	0.001	0.015	0.016
Collision with fixed object	0.040	0.168	0.208
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.013	0.036	0.049
Collision with pedestrian	0.006		0.006
Collision with bicycle	0.005		0.005
Subtotal	0.066	0.222	0.288
Total	0.318	0.830	1.148

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	15000
AADTminor	1860
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.39	0.65	1.04

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.129	0.246	0.375
Head-on collision	0.014	0.013	0.027
Angle collision	0.105	0.146	0.251
Sideswipe	0.039	0.022	0.061
Other multiple-vehicle collision	0.020	0.131	0.151
Subtotal	0.307	0.558	0.865
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.033	0.080	0.113
Collision with other object	0.004	0.009	0.013
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.005	0.003	0.008
Collision with pedestrian	0.021		0.021
Collision with bicycle	0.016		0.016
Subtotal	0.081	0.096	0.177
Total	0.388	0.654	1.042

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.19	0.51	0.70
Crash rate (crashes/mi/year)	1.0	2.5	3.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.109	0.280	0.389
Head-on collision	0.010	0.001	0.011
Angle collision	0.013	0.028	0.041
Sideswipe, same direction	0.002	0.011	0.013
Sideswipe, opposite direction	0.011	0.020	0.031
Other multiple-vehicle collision	0.004	0.019	0.023
Subtotal	0.149	0.359	0.508
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.112	0.139
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.024	0.033
Collision with pedestrian	0.003		0.003
Collision with bicycle	0.003		0.003
Subtotal	0.043	0.148	0.191
Total	0.192	0.507	0.699

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	15000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.44	0.77	1.20

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.116	0.240	0.356
Head-on collision	0.014	0.019	0.033
Angle collision	0.151	0.215	0.366
Sideswipe	0.042	0.028	0.070
Other multiple-vehicle collision	0.021	0.139	0.160
Subtotal	0.344	0.641	0.985
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.033	0.106	0.139
Collision with other object	0.004	0.009	0.013
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.021		0.021
Subtotal	0.094	0.125	0.219
Total	0.438	0.766	1.204

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	5
Other driveways	1
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.23	0.58	0.81
Crash rate (crashes/mi/year)	1.1	2.9	4.0

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.109	0.280	0.389
Head-on collision	0.010	0.001	0.011
Angle collision	0.013	0.028	0.041
Sideswipe, same direction	0.002	0.011	0.013
Sideswipe, opposite direction	0.011	0.020	0.031
Other multiple-vehicle collision	0.004	0.019	0.023
Subtotal	0.183	0.430	0.613
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.112	0.139
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.024	0.033
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.148	0.192
Total	0.227	0.578	0.805

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	15000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.23	0.22	0.45

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.082	0.084	0.166
Head-on collision	0.009	0.004	0.013
Angle collision	0.067	0.050	0.117
Sideswipe	0.025	0.008	0.033
Other multiple-vehicle collision	0.013	0.045	0.058
Subtotal	0.196	0.191	0.387

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.011	0.027	0.038
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.001	0.003
Collision with pedestrian	0.009		0.009
Collision with bicycle	0.007		0.007
Subtotal	0.031	0.033	0.064
Total	0.227	0.224	0.451

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	15000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.10	0.28	0.38
Crash rate (crashes/mi/year)	1.0	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.054	0.141	0.195
Head-on collision	0.005	0.001	0.006
Angle collision	0.006	0.014	0.020
Sideswipe, same direction	0.001	0.006	0.007
Sideswipe, opposite direction	0.005	0.010	0.015
Other multiple-vehicle collision	0.002	0.010	0.012
Subtotal	0.083	0.204	0.287
Single-Vehicle Collisions			
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.013	0.056	0.069
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.004	0.012	0.016
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.021	0.074	0.095
Total	0.104	0.278	0.382

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	14000
AADTminor	5000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.50	0.99	1.48

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.157	0.365	0.522
Head-on collision	0.017	0.019	0.036
Angle collision	0.128	0.217	0.345
Sideswipe	0.047	0.033	0.080
Other multiple-vehicle collision	0.024	0.195	0.219
Subtotal	0.373	0.829	1.202
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.053	0.131	0.184
Collision with other object	0.006	0.014	0.020
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.030		0.030
Collision with bicycle	0.023		0.023
Subtotal	0.122	0.157	0.279
Total	0.495	0.986	1.481

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	4
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.18	0.46	0.63
Crash rate (crashes/mi/year)	0.9	2.3	3.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.085	0.220	0.305
Head-on collision	0.008	0.001	0.009
Angle collision	0.010	0.022	0.032
Sideswipe, same direction	0.002	0.009	0.011
Sideswipe, opposite direction	0.009	0.016	0.025
Other multiple-vehicle collision	0.003	0.015	0.018
Subtotal	0.135	0.320	0.455
Single-Vehicle Collisions			
Collision with animal	0.001	0.009	0.010
Collision with fixed object	0.026	0.102	0.128
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.022	0.031
Collision with pedestrian	0.003		0.003
Collision with bicycle	0.003		0.003
Subtotal	0.042	0.135	0.177
Total	0.177	0.455	0.632

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	23500
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.67	0.93
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.176	0.365	0.541
Head-on collision	0.004	0.004	0.008
Angle collision	0.008	0.020	0.028
Sideswipe, same direction	0.011	0.123	0.134
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.010	0.039	0.049
Subtotal	0.211	0.552	0.763
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.013	0.097	0.110
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.012	0.013	0.025
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.005		0.005
Subtotal	0.048	0.119	0.167
Total	0.259	0.671	0.930

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	23500
AADTminor	1530
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.55	0.79	1.35

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.159	0.266	0.425
Head-on collision	0.019	0.021	0.040
Angle collision	0.206	0.238	0.444
Sideswipe	0.057	0.031	0.088
Other multiple-vehicle collision	0.028	0.154	0.182
Subtotal	0.469	0.710	1.179
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.071	0.093
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.028		0.028
Collision with bicycle	0.023		0.023
Subtotal	0.084	0.084	0.168
Total	0.553	0.794	1.347

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	23500
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.70	0.98
Crash rate (crashes/mi/year)	1.4	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.176	0.365	0.541
Head-on collision	0.004	0.004	0.008
Angle collision	0.008	0.020	0.028
Sideswipe, same direction	0.011	0.123	0.134
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.010	0.039	0.049
Subtotal	0.223	0.584	0.807
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.013	0.097	0.110
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.012	0.013	0.025
Collision with pedestrian	0.018		0.018
Collision with bicycle	0.005		0.005
Subtotal	0.049	0.119	0.168
Total	0.272	0.703	0.975

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	23500
AADTminor	740
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.46	0.65	1.11

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.163	0.259	0.422
Head-on collision	0.017	0.014	0.031
Angle collision	0.133	0.154	0.287
Sideswipe	0.049	0.024	0.073
Other multiple-vehicle collision	0.025	0.138	0.163
Subtotal	0.387	0.589	0.976
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.022	0.053	0.075
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.003	0.002	0.005
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.017		0.017
Subtotal	0.068	0.063	0.131
Total	0.455	0.652	1.107

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	23500
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.67	0.93
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.176	0.365	0.541
Head-on collision	0.004	0.004	0.008
Angle collision	0.008	0.020	0.028
Sideswipe, same direction	0.011	0.123	0.134
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.010	0.039	0.049
Subtotal	0.211	0.552	0.763
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.013	0.097	0.110
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.012	0.013	0.025
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.005		0.005
Subtotal	0.048	0.119	0.167
Total	0.259	0.671	0.930

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	22750
AADTminor	500
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.68	1.24	1.92

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.277	0.562	0.839
Head-on collision	0.030	0.035	0.065
Angle collision	0.213	0.284	0.497
Sideswipe	0.061	0.037	0.098
Other multiple-vehicle collision	0.034	0.246	0.280
Subtotal	0.615	1.164	1.779

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.018	0.066	0.084
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.003	0.003	0.006
Collision with pedestrian	0.010		0.010
Collision with bicycle	0.028		0.028
Subtotal	0.062	0.076	0.138
Total	0.677	1.240	1.917

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.6
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.72	1.86	2.58
Crash rate (crashes/mi/year)	1.2	3.1	4.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.485	0.998	1.483
Head-on collision	0.012	0.011	0.023
Angle collision	0.023	0.054	0.077
Sideswipe, same direction	0.029	0.336	0.365
Sideswipe, opposite direction	0.006	0.002	0.008
Other multiple-vehicle collision	0.028	0.107	0.135
Subtotal	0.586	1.514	2.100
Single-Vehicle Collisions			
Collision with animal	0.000	0.022	0.022
Collision with fixed object	0.036	0.282	0.318
Collision with other object	0.002	0.006	0.008
Other single-vehicle collision	0.034	0.037	0.071
Collision with pedestrian	0.048		0.048
Collision with bicycle	0.013		0.013
Subtotal	0.133	0.347	0.480
Total	0.719	1.861	2.580

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	22000
AADTminor	2770
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.64	1.16	1.80

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.218	0.457	0.675
Head-on collision	0.023	0.024	0.047
Angle collision	0.178	0.272	0.450
Sideswipe	0.065	0.042	0.107
Other multiple-vehicle collision	0.034	0.244	0.278
Subtotal	0.518	1.039	1.557
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.043	0.104	0.147
Collision with other object	0.005	0.012	0.017
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.028		0.028
Subtotal	0.120	0.125	0.245
Total	0.638	1.164	1.802

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.7
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.84	2.16	3.00
Crash rate (crashes/mi/year)	1.2	3.1	4.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.566	1.164	1.730
Head-on collision	0.014	0.012	0.026
Angle collision	0.027	0.063	0.090
Sideswipe, same direction	0.034	0.392	0.426
Sideswipe, opposite direction	0.007	0.002	0.009
Other multiple-vehicle collision	0.033	0.125	0.158
Subtotal	0.681	1.758	2.439
Single-Vehicle Collisions			
Collision with animal	0.000	0.025	0.025
Collision with fixed object	0.042	0.328	0.370
Collision with other object	0.002	0.006	0.008
Other single-vehicle collision	0.040	0.044	0.084
Collision with pedestrian	0.056		0.056
Collision with bicycle	0.015		0.015
Subtotal	0.155	0.403	0.558
Total	0.836	2.161	2.997

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	21000
AADTminor	7500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	#Error
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.83	1.79	2.62

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.697	0.968
Head-on collision	0.029	0.036	0.065
Angle collision	0.221	0.415	0.636
Sideswipe	0.081	0.063	0.144
Other multiple-vehicle collision	0.042	0.372	0.414
Subtotal	0.644	1.583	2.227
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.001	0.001
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.070	0.171	0.241
Collision with other object	0.008	0.019	0.027
Other single-vehicle collision	0.004	0.005	0.009
Single-vehicle noncollision	0.010	0.006	0.016
Collision with pedestrian	0.053		0.053
Collision with bicycle	0.040		0.040
Subtotal	0.185	0.206	0.391
Total	0.829	1.789	2.618

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	20000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.55	0.76
Crash rate (crashes/mi/year)	1.1	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.143	0.291	0.434
Head-on collision	0.003	0.003	0.006
Angle collision	0.007	0.016	0.023
Sideswipe, same direction	0.009	0.098	0.107
Sideswipe, opposite direction	0.002	0.000	0.002
Other multiple-vehicle collision	0.008	0.031	0.039
Subtotal	0.172	0.439	0.611
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.012	0.090	0.102
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.011	0.012	0.023
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.004		0.004
Subtotal	0.042	0.111	0.153
Total	0.214	0.550	0.764

CENTER SECTION - ALL BUILD VOLUMES
WISCONSIN SOUTHERN RAILROAD/GLACIAL DRUMLIN TRAIL TO US 18

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.90
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.202	0.491	0.693
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.165	0.210
Total	0.247	0.656	0.903

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	1160
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.56	0.84	1.40

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.157	0.277	0.434
Head-on collision	0.019	0.022	0.041
Angle collision	0.204	0.248	0.452
Sideswipe	0.056	0.033	0.089
Other multiple-vehicle collision	0.028	0.161	0.189
Subtotal	0.464	0.741	1.205
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.086	0.112
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.030		0.030
Collision with bicycle	0.024		0.024
Subtotal	0.092	0.102	0.194
Total	0.556	0.843	1.399

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.76	1.06
Crash rate (crashes/mi/year)	1.5	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.253	0.598	0.851
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.299	0.763	1.062

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	560
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.32	0.43	0.75

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.112	0.167	0.279
Head-on collision	0.012	0.009	0.021
Angle collision	0.092	0.100	0.192
Sideswipe	0.034	0.015	0.049
Other multiple-vehicle collision	0.017	0.089	0.106
Subtotal	0.267	0.380	0.647
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.018	0.044	0.062
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.003	0.002	0.005
Collision with pedestrian	0.015		0.015
Collision with bicycle	0.012		0.012
Subtotal	0.051	0.053	0.104
Total	0.318	0.433	0.751

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.90
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.202	0.491	0.693
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.165	0.210
Total	0.247	0.656	0.903

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	17500
AADTminor	5000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.84	1.65	2.49

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.335	0.743	1.078
Head-on collision	0.036	0.046	0.082
Angle collision	0.258	0.375	0.633
Sideswipe	0.074	0.049	0.123
Other multiple-vehicle collision	0.041	0.325	0.366
Subtotal	0.744	1.538	2.282
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.031	0.098	0.129
Collision with other object	0.003	0.008	0.011
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.019		0.019
Collision with bicycle	0.037		0.037
Subtotal	0.098	0.113	0.211
Total	0.842	1.651	2.493

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.6
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.70	1.84	2.54
Crash rate (crashes/mi/year)	1.2	3.1	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.401	1.039	1.440
Head-on collision	0.037	0.005	0.042
Angle collision	0.047	0.106	0.153
Sideswipe, same direction	0.008	0.041	0.049
Sideswipe, opposite direction	0.040	0.073	0.113
Other multiple-vehicle collision	0.016	0.071	0.087
Subtotal	0.561	1.359	1.920
Single-Vehicle Collisions			
Collision with animal	0.003	0.032	0.035
Collision with fixed object	0.081	0.364	0.445
Collision with other object	0.001	0.006	0.007
Other single-vehicle collision	0.027	0.078	0.105
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.010		0.010
Subtotal	0.135	0.480	0.615
Total	0.696	1.839	2.535

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Intersection type	3ST
AADTmajor	17000
AADTminor	2100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.45	0.79	1.24

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.153	0.300	0.453
Head-on collision	0.016	0.016	0.032
Angle collision	0.125	0.179	0.304
Sideswipe	0.046	0.027	0.073
Other multiple-vehicle collision	0.024	0.160	0.184
Subtotal	0.364	0.682	1.046
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.035	0.087	0.122
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.005	0.003	0.008
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.019		0.019
Subtotal	0.090	0.104	0.194
Total	0.454	0.786	1.240

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.80	2.12	2.92
Crash rate (crashes/mi/year)	1.1	3.0	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.467	1.213	1.680
Head-on collision	0.044	0.006	0.050
Angle collision	0.054	0.123	0.177
Sideswipe, same direction	0.010	0.048	0.058
Sideswipe, opposite direction	0.047	0.086	0.133
Other multiple-vehicle collision	0.019	0.083	0.102
Subtotal	0.641	1.559	2.200
Single-Vehicle Collisions			
Collision with animal	0.003	0.037	0.040
Collision with fixed object	0.095	0.424	0.519
Collision with other object	0.001	0.007	0.008
Other single-vehicle collision	0.032	0.090	0.122
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.012		0.012
Subtotal	0.157	0.558	0.715
Total	0.798	2.117	2.915

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	16500
AADTminor	5900
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.61	1.26	1.86

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.196	0.475	0.671
Head-on collision	0.021	0.025	0.046
Angle collision	0.159	0.283	0.442
Sideswipe	0.059	0.043	0.102
Other multiple-vehicle collision	0.030	0.254	0.284
Subtotal	0.465	1.080	1.545
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.001	0.001
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.059	0.146	0.205
Collision with other object	0.007	0.016	0.023
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.038		0.038
Collision with bicycle	0.029		0.029
Subtotal	0.144	0.175	0.319
Total	0.609	1.255	1.864

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane on mapped bypass alignment alternative	Analysis Date	6/28/2011 10:16 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.56	0.76
Crash rate (crashes/mi/year)	1.0	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.120	0.314	0.434
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.164	0.403	0.567
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.116	0.143
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.025	0.034
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.153	0.197
Total	0.208	0.556	0.764

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.90
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.202	0.491	0.693
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.165	0.210
Total	0.247	0.656	0.903

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	18000
AADTminor	1160
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.56	0.84	1.40

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.157	0.277	0.434
Head-on collision	0.019	0.022	0.041
Angle collision	0.204	0.248	0.452
Sideswipe	0.056	0.033	0.089
Other multiple-vehicle collision	0.028	0.161	0.189
Subtotal	0.464	0.741	1.205
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.026	0.086	0.112
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.030		0.030
Collision with bicycle	0.024		0.024
Subtotal	0.092	0.102	0.194
Total	0.556	0.843	1.399

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.76	1.06
Crash rate (crashes/mi/year)	1.5	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.253	0.598	0.851
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.299	0.763	1.062

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	560
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.32	0.43	0.75

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.112	0.167	0.279
Head-on collision	0.012	0.009	0.021
Angle collision	0.092	0.100	0.192
Sideswipe	0.034	0.015	0.049
Other multiple-vehicle collision	0.017	0.089	0.106
Subtotal	0.267	0.380	0.647
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.018	0.044	0.062
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.003	0.002	0.005
Collision with pedestrian	0.015		0.015
Collision with bicycle	0.012		0.012
Subtotal	0.051	0.053	0.104
Total	0.318	0.433	0.751

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.90
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.202	0.491	0.693
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.004		0.004
Subtotal	0.045	0.165	0.210
Total	0.247	0.656	0.903

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	17500
AADTminor	5000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.84	1.65	2.49

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.335	0.743	1.078
Head-on collision	0.036	0.046	0.082
Angle collision	0.258	0.375	0.633
Sideswipe	0.074	0.049	0.123
Other multiple-vehicle collision	0.041	0.325	0.366
Subtotal	0.744	1.538	2.282
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.031	0.098	0.129
Collision with other object	0.003	0.008	0.011
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.019		0.019
Collision with bicycle	0.037		0.037
Subtotal	0.098	0.113	0.211
Total	0.842	1.651	2.493

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.35	0.92	1.27
Crash rate (crashes/mi/year)	1.2	3.1	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.200	0.520	0.720
Head-on collision	0.019	0.003	0.022
Angle collision	0.023	0.053	0.076
Sideswipe, same direction	0.004	0.021	0.025
Sideswipe, opposite direction	0.020	0.037	0.057
Other multiple-vehicle collision	0.008	0.035	0.043
Subtotal	0.280	0.681	0.961
Single-Vehicle Collisions			
Collision with animal	0.001	0.016	0.017
Collision with fixed object	0.041	0.181	0.222
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.014	0.039	0.053
Collision with pedestrian	0.006		0.006
Collision with bicycle	0.005		0.005
Subtotal	0.068	0.239	0.307
Total	0.348	0.920	1.268

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
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Input Data

Intersection type	4ST
AADTmajor	17000
AADTminor	110
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.50	0.85	1.35

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.134	0.270	0.404
Head-on collision	0.016	0.022	0.038
Angle collision	0.174	0.242	0.416
Sideswipe	0.048	0.032	0.080
Other multiple-vehicle collision	0.024	0.157	0.181
Subtotal	0.396	0.723	1.119
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.035	0.112	0.147
Collision with other object	0.005	0.009	0.014
Other single-vehicle collision	0.003	0.001	0.004
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.029		0.029
Collision with bicycle	0.023		0.023
Subtotal	0.104	0.131	0.235
Total	0.500	0.854	1.354

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	6
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.38	0.98	1.36
Crash rate (crashes/mi/year)	1.3	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.200	0.520	0.720
Head-on collision	0.019	0.003	0.022
Angle collision	0.023	0.053	0.076
Sideswipe, same direction	0.004	0.021	0.025
Sideswipe, opposite direction	0.020	0.037	0.057
Other multiple-vehicle collision	0.008	0.035	0.043
Subtotal	0.309	0.743	1.052
Single-Vehicle Collisions			
Collision with animal	0.001	0.016	0.017
Collision with fixed object	0.041	0.181	0.222
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.014	0.039	0.053
Collision with pedestrian	0.007		0.007
Collision with bicycle	0.005		0.005
Subtotal	0.069	0.239	0.308
Total	0.378	0.982	1.360

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	17000
AADTminor	2100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.45	0.79	1.24

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.153	0.300	0.453
Head-on collision	0.016	0.016	0.032
Angle collision	0.125	0.179	0.304
Sideswipe	0.046	0.027	0.073
Other multiple-vehicle collision	0.024	0.160	0.184
Subtotal	0.364	0.682	1.046
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.035	0.087	0.122
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.005	0.003	0.008
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.019		0.019
Subtotal	0.090	0.104	0.194
Total	0.454	0.786	1.240

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.23	0.60	0.83
Crash rate (crashes/mi/year)	1.1	3.0	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.134	0.346	0.480
Head-on collision	0.012	0.002	0.014
Angle collision	0.016	0.035	0.051
Sideswipe, same direction	0.003	0.014	0.017
Sideswipe, opposite direction	0.013	0.024	0.037
Other multiple-vehicle collision	0.005	0.024	0.029
Subtotal	0.183	0.445	0.628
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.121	0.148
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.026	0.035
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.159	0.203
Total	0.227	0.604	0.831

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	17000
AADTminor	110
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.50	0.85	1.35

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.134	0.270	0.404
Head-on collision	0.016	0.022	0.038
Angle collision	0.174	0.242	0.416
Sideswipe	0.048	0.032	0.080
Other multiple-vehicle collision	0.024	0.157	0.181
Subtotal	0.396	0.723	1.119
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.035	0.112	0.147
Collision with other object	0.005	0.009	0.014
Other single-vehicle collision	0.003	0.001	0.004
Single-vehicle noncollision	0.009	0.006	0.015
Collision with pedestrian	0.029		0.029
Collision with bicycle	0.023		0.023
Subtotal	0.104	0.131	0.235
Total	0.500	0.854	1.354

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
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Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	5
Other driveways	1
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.69	0.95
Crash rate (crashes/mi/year)	1.3	3.4	4.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.134	0.346	0.480
Head-on collision	0.012	0.002	0.014
Angle collision	0.016	0.035	0.051
Sideswipe, same direction	0.003	0.014	0.017
Sideswipe, opposite direction	0.013	0.024	0.037
Other multiple-vehicle collision	0.005	0.024	0.029
Subtotal	0.221	0.526	0.747
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.121	0.148
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.026	0.035
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.159	0.205
Total	0.267	0.685	0.952

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Intersection type	3ST
AADTmajor	17000
AADTminor	110
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.27	0.53

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.097	0.102	0.199
Head-on collision	0.010	0.005	0.015
Angle collision	0.079	0.061	0.140
Sideswipe	0.029	0.009	0.038
Other multiple-vehicle collision	0.015	0.055	0.070
Subtotal	0.230	0.232	0.462
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.011	0.028	0.039
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.001	0.003
Collision with pedestrian	0.011		0.011
Collision with bicycle	0.008		0.008
Subtotal	0.034	0.034	0.068
Total	0.264	0.266	0.530

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	17000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.13	0.33	0.45
Crash rate (crashes/mi/year)	1.3	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.066	0.173	0.239
Head-on collision	0.006	0.001	0.007
Angle collision	0.008	0.018	0.026
Sideswipe, same direction	0.001	0.007	0.008
Sideswipe, opposite direction	0.007	0.012	0.019
Other multiple-vehicle collision	0.003	0.012	0.015
Subtotal	0.103	0.247	0.350
Single-Vehicle Collisions			
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.014	0.061	0.075
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.013	0.018
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.023	0.080	0.103
Total	0.126	0.327	0.453

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
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Input Data

Intersection type	3ST
AADTmajor	16500
AADTminor	5900
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.61	1.26	1.86

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.196	0.475	0.671
Head-on collision	0.021	0.025	0.046
Angle collision	0.159	0.283	0.442
Sideswipe	0.059	0.043	0.102
Other multiple-vehicle collision	0.030	0.254	0.284
Subtotal	0.465	1.080	1.545
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.001	0.001
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.059	0.146	0.205
Collision with other object	0.007	0.016	0.023
Other single-vehicle collision	0.003	0.004	0.007
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.038		0.038
Collision with bicycle	0.029		0.029
Subtotal	0.144	0.175	0.319
Total	0.609	1.255	1.864

General Information

Analyst	Matt Tronnes	Analysis Name	Two-Lane full reconstruction on existing alignment alternative	Analysis Date	6/28/2011 10:57 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	16000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	4
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.23	0.60	0.83
Crash rate (crashes/mi/year)	1.2	3.0	4.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.120	0.314	0.434
Head-on collision	0.011	0.002	0.013
Angle collision	0.014	0.032	0.046
Sideswipe, same direction	0.002	0.012	0.014
Sideswipe, opposite direction	0.012	0.022	0.034
Other multiple-vehicle collision	0.005	0.021	0.026
Subtotal	0.186	0.449	0.635
Single-Vehicle Collisions			
Collision with animal	0.001	0.010	0.011
Collision with fixed object	0.027	0.116	0.143
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.025	0.034
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.044	0.153	0.197
Total	0.230	0.602	0.832

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	23500
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.67	0.93
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.176	0.365	0.541
Head-on collision	0.004	0.004	0.008
Angle collision	0.008	0.020	0.028
Sideswipe, same direction	0.011	0.123	0.134
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.010	0.039	0.049
Subtotal	0.211	0.552	0.763
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.013	0.097	0.110
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.012	0.013	0.025
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.005		0.005
Subtotal	0.048	0.119	0.167
Total	0.259	0.671	0.930

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	23500
AADTminor	1530
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.55	0.79	1.35

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.159	0.266	0.425
Head-on collision	0.019	0.021	0.040
Angle collision	0.206	0.238	0.444
Sideswipe	0.057	0.031	0.088
Other multiple-vehicle collision	0.028	0.154	0.182
Subtotal	0.469	0.710	1.179
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.071	0.093
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.028		0.028
Collision with bicycle	0.023		0.023
Subtotal	0.084	0.084	0.168
Total	0.553	0.794	1.347

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	23500
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	2
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.70	0.98
Crash rate (crashes/mi/year)	1.4	3.5	4.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.176	0.365	0.541
Head-on collision	0.004	0.004	0.008
Angle collision	0.008	0.020	0.028
Sideswipe, same direction	0.011	0.123	0.134
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.010	0.039	0.049
Subtotal	0.223	0.584	0.807
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.013	0.097	0.110
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.012	0.013	0.025
Collision with pedestrian	0.018		0.018
Collision with bicycle	0.005		0.005
Subtotal	0.049	0.119	0.168
Total	0.272	0.703	0.975

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	23500
AADTminor	740
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.46	0.65	1.11

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.163	0.259	0.422
Head-on collision	0.017	0.014	0.031
Angle collision	0.133	0.154	0.287
Sideswipe	0.049	0.024	0.073
Other multiple-vehicle collision	0.025	0.138	0.163
Subtotal	0.387	0.589	0.976
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.022	0.053	0.075
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.003	0.002	0.005
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.017		0.017
Subtotal	0.068	0.063	0.131
Total	0.455	0.652	1.107

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	23500
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.26	0.67	0.93
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.176	0.365	0.541
Head-on collision	0.004	0.004	0.008
Angle collision	0.008	0.020	0.028
Sideswipe, same direction	0.011	0.123	0.134
Sideswipe, opposite direction	0.002	0.001	0.003
Other multiple-vehicle collision	0.010	0.039	0.049
Subtotal	0.211	0.552	0.763
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.013	0.097	0.110
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.012	0.013	0.025
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.005		0.005
Subtotal	0.048	0.119	0.167
Total	0.259	0.671	0.930

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	22750
AADTminor	500
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.68	1.24	1.92

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.277	0.562	0.839
Head-on collision	0.030	0.035	0.065
Angle collision	0.213	0.284	0.497
Sideswipe	0.061	0.037	0.098
Other multiple-vehicle collision	0.034	0.246	0.280
Subtotal	0.615	1.164	1.779
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.018	0.066	0.084
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.003	0.003	0.006
Collision with pedestrian	0.010		0.010
Collision with bicycle	0.028		0.028
Subtotal	0.062	0.076	0.138
Total	0.677	1.240	1.917

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.6
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.72	1.86	2.58
Crash rate (crashes/mi/year)	1.2	3.1	4.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.485	0.998	1.483
Head-on collision	0.012	0.011	0.023
Angle collision	0.023	0.054	0.077
Sideswipe, same direction	0.029	0.336	0.365
Sideswipe, opposite direction	0.006	0.002	0.008
Other multiple-vehicle collision	0.028	0.107	0.135
Subtotal	0.586	1.514	2.100
Single-Vehicle Collisions			
Collision with animal	0.000	0.022	0.022
Collision with fixed object	0.036	0.282	0.318
Collision with other object	0.002	0.006	0.008
Other single-vehicle collision	0.034	0.037	0.071
Collision with pedestrian	0.048		0.048
Collision with bicycle	0.013		0.013
Subtotal	0.133	0.347	0.480
Total	0.719	1.861	2.580

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	22000
AADTminor	2770
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.64	1.16	1.80

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.218	0.457	0.675
Head-on collision	0.023	0.024	0.047
Angle collision	0.178	0.272	0.450
Sideswipe	0.065	0.042	0.107
Other multiple-vehicle collision	0.034	0.244	0.278
Subtotal	0.518	1.039	1.557

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.043	0.104	0.147
Collision with other object	0.005	0.012	0.017
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.028		0.028
Subtotal	0.120	0.125	0.245
Total	0.638	1.164	1.802

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.7
AADT (veh/day)	22000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.84	2.16	3.00
Crash rate (crashes/mi/year)	1.2	3.1	4.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.566	1.164	1.730
Head-on collision	0.014	0.012	0.026
Angle collision	0.027	0.063	0.090
Sideswipe, same direction	0.034	0.392	0.426
Sideswipe, opposite direction	0.007	0.002	0.009
Other multiple-vehicle collision	0.033	0.125	0.158
Subtotal	0.681	1.758	2.439
Single-Vehicle Collisions			
Collision with animal	0.000	0.025	0.025
Collision with fixed object	0.042	0.328	0.370
Collision with other object	0.002	0.006	0.008
Other single-vehicle collision	0.040	0.044	0.084
Collision with pedestrian	0.056		0.056
Collision with bicycle	0.015		0.015
Subtotal	0.155	0.403	0.558
Total	0.836	2.161	2.997

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	21000
AADTminor	7500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	#Error
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.83	1.79	2.62

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.697	0.968
Head-on collision	0.029	0.036	0.065
Angle collision	0.221	0.415	0.636
Sideswipe	0.081	0.063	0.144
Other multiple-vehicle collision	0.042	0.372	0.414
Subtotal	0.644	1.583	2.227
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.001	0.001
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.070	0.171	0.241
Collision with other object	0.008	0.019	0.027
Other single-vehicle collision	0.004	0.005	0.009
Single-vehicle noncollision	0.010	0.006	0.016
Collision with pedestrian	0.053		0.053
Collision with bicycle	0.040		0.040
Subtotal	0.185	0.206	0.391
Total	0.829	1.789	2.618

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane on mapped bypassalignment alternative	Analysis Date	6/28/2011 9:35 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	Center Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	20000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.21	0.55	0.76
Crash rate (crashes/mi/year)	1.1	2.8	3.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.143	0.291	0.434
Head-on collision	0.003	0.003	0.006
Angle collision	0.007	0.016	0.023
Sideswipe, same direction	0.009	0.098	0.107
Sideswipe, opposite direction	0.002	0.000	0.002
Other multiple-vehicle collision	0.008	0.031	0.039
Subtotal	0.172	0.439	0.611
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.012	0.090	0.102
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.011	0.012	0.023
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.004		0.004
Subtotal	0.042	0.111	0.153
Total	0.214	0.550	0.764

SOUTH SECTION
WIS 59 TO WISCONSIN SOUTHERN RAILROAD/GLACIAL DRUMLIN TRAIL

General Information					
Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data		Summary Results			
Road type	2U	Collision Type	Fatal and Injury	Property Damage Only	Total
Length of segment, L (mi)	0.1	Total	0.14	0.34	0.47
AADT (veh/day)	13000	Crash rate (crashes/mi/year)	1.4	3.4	4.7
Type of on-street parking	None	Crash Severity Distribution			
Land use	Commercial/Industrial/ Institutional	Collision Type	Fatal and Injury	Property Damage Only	Total
Curb length with on-street parking		Multiple-Vehicle Collisions			
Median width (ft)	20	Rear-end collision	0.050	0.131	0.181
Lighting	Not Present	Head-on collision	0.005	0.001	0.006
Automated speed enforcement	Not Present	Angle collision	0.006	0.013	0.019
Major commercial driveways	0	Sideswipe, same direction	0.001	0.005	0.006
Minor commercial driveways	2	Sideswipe, opposite direction	0.005	0.009	0.014
Major industrial/institutional driveways	0	Other multiple-vehicle collision	0.002	0.009	0.011
Minor industrial/institutional driveways	0	Subtotal	0.111	0.256	0.367
Major residential driveways	0	Single-Vehicle Collisions			
Minor residential driveways	0	Collision with animal	0.001	0.005	0.006
Other driveways	1	Collision with fixed object	0.015	0.061	0.076
Speed Category	31	Collision with other object	0.000	0.001	0.001
Roadside fixed object density (fixed objects/mi)	50	Other single-vehicle collision	0.005	0.013	0.018
Offset to roadside fixed objects (ft)	11	Collision with pedestrian	0.002		0.002
Calibration Factor, Cr	1.00	Collision with bicycle	0.002		0.002
		Subtotal	0.025	0.080	0.105
		Total	0.136	0.336	0.472

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	13000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.38	0.51	0.89

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.132	0.189	0.321
Head-on collision	0.014	0.010	0.024
Angle collision	0.108	0.112	0.220
Sideswipe	0.040	0.017	0.057
Other multiple-vehicle collision	0.020	0.101	0.121
Subtotal	0.314	0.429	0.743
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.028	0.068	0.096
Collision with other object	0.003	0.008	0.011
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.018		0.018
Collision with bicycle	0.014		0.014
Subtotal	0.068	0.081	0.149
Total	0.382	0.510	0.892

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	3
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	72
Offset to roadside fixed objects (ft)	13
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.22	0.56	0.78
Crash rate (crashes/mi/year)	1.1	2.8	3.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.107	0.278	0.385
Head-on collision	0.010	0.001	0.011
Angle collision	0.012	0.028	0.040
Sideswipe, same direction	0.002	0.011	0.013
Sideswipe, opposite direction	0.011	0.020	0.031
Other multiple-vehicle collision	0.004	0.019	0.023
Subtotal	0.164	0.392	0.556
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.033	0.128	0.161
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.011	0.027	0.038
Collision with pedestrian	0.004		0.004
Collision with bicycle	0.003		0.003
Subtotal	0.052	0.168	0.220
Total	0.216	0.560	0.776

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	18000
AADTminor	13000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.63	3.26	4.89

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			

Rear-end collision	0.651	1.463	2.114
Head-on collision	0.071	0.091	0.162
Angle collision	0.502	0.739	1.241
Sideswipe	0.143	0.097	0.240
Other multiple-vehicle collision	0.080	0.639	0.719
Subtotal	1.447	3.029	4.476

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.065	0.197	0.262
Collision with other object	0.006	0.016	0.022
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.012	0.008	0.020
Collision with pedestrian	0.027		0.027
Collision with bicycle	0.072		0.072
Subtotal	0.185	0.226	0.411
Total	1.632	3.255	4.887

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	64
Offset to roadside fixed objects (ft)	20
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.01	2.68	3.69
Crash rate (crashes/mi/year)	1.4	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.594	1.551	2.145
Head-on collision	0.055	0.008	0.063
Angle collision	0.069	0.158	0.227
Sideswipe, same direction	0.012	0.062	0.074
Sideswipe, opposite direction	0.059	0.110	0.169
Other multiple-vehicle collision	0.024	0.106	0.130
Subtotal	0.820	2.010	2.830
Single-Vehicle Collisions			
Collision with animal	0.004	0.044	0.048
Collision with fixed object	0.111	0.510	0.621
Collision with other object	0.002	0.009	0.011
Other single-vehicle collision	0.037	0.109	0.146
Collision with pedestrian	0.018		0.018
Collision with bicycle	0.015		0.015
Subtotal	0.187	0.672	0.859
Total	1.007	2.682	3.689

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
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Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.42	0.73	1.15

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.144	0.280	0.424
Head-on collision	0.015	0.015	0.030
Angle collision	0.118	0.167	0.285
Sideswipe	0.043	0.025	0.068
Other multiple-vehicle collision	0.022	0.149	0.171
Subtotal	0.342	0.636	0.978
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.031	0.077	0.108
Collision with other object	0.004	0.008	0.012
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.004	0.003	0.007
Collision with pedestrian	0.023		0.023
Collision with bicycle	0.018		0.018
Subtotal	0.082	0.092	0.174
Total	0.424	0.728	1.152

General Information					
Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data		Summary Results			
Road type	2U	Collision Type	Fatal and Injury	Property Damage Only	Total
Length of segment, L (mi)	0.1	Total	0.14	0.37	0.52
AADT (veh/day)	18000	Crash rate (crashes/mi/year)	1.4	3.7	5.2
Type of on-street parking	None	Crash Severity Distribution			
Land use	Commercial/Industrial/ Institutional	Collision Type	Fatal and Injury	Property Damage Only	Total
Curb length with on-street parking		Multiple-Vehicle Collisions			
Median width (ft)	10	Rear-end collision	0.081	0.210	0.291
Lighting	Not Present	Head-on collision	0.008	0.001	0.009
Automated speed enforcement	Not Present	Angle collision	0.009	0.021	0.030
Major commercial driveways	0	Sideswipe, same direction	0.002	0.008	0.010
Minor commercial driveways	0	Sideswipe, opposite direction	0.008	0.015	0.023
Major industrial/institutional driveways	0	Other multiple-vehicle collision	0.003	0.014	0.017
Minor industrial/institutional driveways	0	Subtotal	0.118	0.283	0.401
Major residential driveways	0	Single-Vehicle Collisions			
Minor residential driveways	1	Collision with animal	0.001	0.006	0.007
Other driveways	0	Collision with fixed object	0.015	0.069	0.084
Speed Category	31	Collision with other object	0.000	0.001	0.001
Roadside fixed object density (fixed objects/mi)	40	Other single-vehicle collision	0.005	0.015	0.020
Offset to roadside fixed objects (ft)	16	Collision with pedestrian	0.003		0.003
Calibration Factor, Cr	1.00	Collision with bicycle	0.002		0.002
		Subtotal	0.026	0.091	0.117
		Total	0.144	0.374	0.518

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.53	0.71	1.24

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.188	0.272	0.460
Head-on collision	0.020	0.014	0.034
Angle collision	0.153	0.162	0.315
Sideswipe	0.056	0.025	0.081
Other multiple-vehicle collision	0.029	0.145	0.174
Subtotal	0.446	0.618	1.064
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.030	0.073	0.103
Collision with other object	0.004	0.008	0.012
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.004	0.003	0.007
Collision with pedestrian	0.025		0.025
Collision with bicycle	0.019		0.019
Subtotal	0.084	0.088	0.172
Total	0.530	0.706	1.236

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	4
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	16
Offset to roadside fixed objects (ft)	22
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.29	0.75	1.04
Crash rate (crashes/mi/year)	1.5	3.7	5.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.246	0.584	0.830
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.292	0.749	1.041

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.70	1.20	1.91

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.239	0.463	0.702
Head-on collision	0.026	0.024	0.050
Angle collision	0.194	0.276	0.470
Sideswipe	0.071	0.042	0.113
Other multiple-vehicle collision	0.037	0.247	0.284
Subtotal	0.567	1.052	1.619

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.052	0.126	0.178
Collision with other object	0.006	0.014	0.020
Other single-vehicle collision	0.003	0.003	0.006
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.039		0.039
Collision with bicycle	0.029		0.029
Subtotal	0.136	0.151	0.287
Total	0.703	1.203	1.906

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	1
Minor residential driveways	3
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	16
Offset to roadside fixed objects (ft)	22
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.76	1.06
Crash rate (crashes/mi/year)	1.5	3.8	5.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.253	0.598	0.851
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.299	0.763	1.062

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	27000
AADTminor	19000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	4
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.64	3.12	4.77

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.662	1.412	2.074
Head-on collision	0.072	0.088	0.160
Angle collision	0.511	0.713	1.224
Sideswipe	0.146	0.094	0.240
Other multiple-vehicle collision	0.081	0.617	0.698
Subtotal	1.472	2.924	4.396

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.050	0.173	0.223
Collision with other object	0.005	0.014	0.019
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.009	0.007	0.016
Collision with pedestrian	0.033		0.033
Collision with bicycle	0.070		0.070
Subtotal	0.170	0.199	0.369
Total	1.642	3.123	4.765

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.91
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.427	0.589
Head-on collision	0.015	0.002	0.017
Angle collision	0.019	0.043	0.062
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.016	0.030	0.046
Other multiple-vehicle collision	0.006	0.029	0.035
Subtotal	0.221	0.548	0.769
Single-Vehicle Collisions			
Collision with animal	0.001	0.007	0.008
Collision with fixed object	0.015	0.085	0.100
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.018	0.023
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.030	0.111	0.141
Total	0.251	0.659	0.910

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	29000
AADTminor	100
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.30	0.30	0.60

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.114	0.120	0.234
Head-on collision	0.012	0.006	0.018
Angle collision	0.093	0.072	0.165
Sideswipe	0.034	0.011	0.045
Other multiple-vehicle collision	0.018	0.064	0.082
Subtotal	0.271	0.273	0.544
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.008	0.020	0.028
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.000	0.001	0.001
Single-vehicle noncollision	0.001	0.001	0.002
Collision with pedestrian	0.012		0.012
Collision with bicycle	0.009		0.009
Subtotal	0.031	0.024	0.055
Total	0.302	0.297	0.599

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.76	1.98	2.74
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.666	1.647	2.313
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423
Total	0.755	1.981	2.736

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.74	0.99	1.73

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.401	0.672
Head-on collision	0.029	0.021	0.050
Angle collision	0.221	0.239	0.460
Sideswipe	0.081	0.036	0.117
Other multiple-vehicle collision	0.042	0.214	0.256
Subtotal	0.644	0.911	1.555
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.027	0.068	0.095
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.027		0.027
Subtotal	0.097	0.080	0.177
Total	0.741	0.991	1.732

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.78	2.02	2.80
Crash rate (crashes/mi/year)	2.6	6.7	9.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.686	1.689	2.375
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423
Total	0.775	2.023	2.798

General Information

Analyst	Matt Tronnes	Analysis Name	Future No Build (2NB)	Analysis Date	6/29/2011 2:53 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	29000
AADTminor	25000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	2
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.93	3.65	5.58

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.782	1.651	2.433
Head-on collision	0.085	0.103	0.188
Angle collision	0.603	0.834	1.437
Sideswipe	0.172	0.109	0.281
Other multiple-vehicle collision	0.096	0.721	0.817
Subtotal	1.738	3.418	5.156

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.057	0.200	0.257
Collision with other object	0.006	0.016	0.022
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.011	0.008	0.019
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.082		0.082
Subtotal	0.195	0.229	0.424
Total	1.933	3.647	5.580

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	2
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.11	0.27	0.37
Crash rate (crashes/mi/year)	1.1	2.7	3.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.042	0.110	0.152
Head-on collision	0.004	0.001	0.005
Angle collision	0.005	0.011	0.016
Sideswipe, same direction	0.001	0.004	0.005
Sideswipe, opposite direction	0.004	0.008	0.012
Other multiple-vehicle collision	0.002	0.008	0.010
Subtotal	0.086	0.201	0.287
Single-Vehicle Collisions			
Collision with animal	0.000	0.004	0.004
Collision with fixed object	0.013	0.051	0.064
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.004	0.011	0.015
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.001		0.001
Subtotal	0.020	0.067	0.087
Total	0.106	0.268	0.374

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	13000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.22	0.30	0.52

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.077	0.110	0.187
Head-on collision	0.008	0.006	0.014
Angle collision	0.062	0.065	0.127
Sideswipe	0.023	0.010	0.033
Other multiple-vehicle collision	0.012	0.059	0.071
Subtotal	0.182	0.250	0.432
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.016	0.040	0.056
Collision with other object	0.002	0.004	0.006
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.001	0.003
Collision with pedestrian	0.011		0.011
Collision with bicycle	0.008		0.008
Subtotal	0.040	0.047	0.087
Total	0.222	0.297	0.519

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	3
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.17	0.45	0.62
Crash rate (crashes/mi/year)	0.9	2.2	3.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.085	0.220	0.305
Head-on collision	0.008	0.001	0.009
Angle collision	0.010	0.022	0.032
Sideswipe, same direction	0.002	0.009	0.011
Sideswipe, opposite direction	0.009	0.016	0.025
Other multiple-vehicle collision	0.003	0.015	0.018
Subtotal	0.131	0.311	0.442
Single-Vehicle Collisions			
Collision with animal	0.001	0.009	0.010
Collision with fixed object	0.026	0.102	0.128
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.022	0.031
Collision with pedestrian	0.003		0.003
Collision with bicycle	0.002		0.002
Subtotal	0.041	0.135	0.176
Total	0.172	0.446	0.618

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	18000
AADTminor	13000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	3
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.55	3.10	4.65

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.620	1.393	2.013
Head-on collision	0.067	0.087	0.154
Angle collision	0.478	0.704	1.182
Sideswipe	0.136	0.092	0.228
Other multiple-vehicle collision	0.076	0.609	0.685
Subtotal	1.377	2.885	4.262

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.061	0.187	0.248
Collision with other object	0.006	0.015	0.021
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.012	0.007	0.019
Collision with pedestrian	0.027		0.027
Collision with bicycle	0.068		0.068
Subtotal	0.177	0.214	0.391
Total	1.554	3.099	4.653

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.87	2.31	3.18
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.512	1.337	1.849
Head-on collision	0.048	0.007	0.055
Angle collision	0.060	0.136	0.196
Sideswipe, same direction	0.011	0.053	0.064
Sideswipe, opposite direction	0.051	0.095	0.146
Other multiple-vehicle collision	0.020	0.091	0.111
Subtotal	0.708	1.732	2.440
Single-Vehicle Collisions			
Collision with animal	0.003	0.038	0.041
Collision with fixed object	0.096	0.439	0.535
Collision with other object	0.001	0.008	0.009
Other single-vehicle collision	0.032	0.094	0.126
Collision with pedestrian	0.016		0.016
Collision with bicycle	0.013		0.013
Subtotal	0.161	0.579	0.740
Total	0.869	2.311	3.180

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.42	0.73	1.15

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.144	0.280	0.424
Head-on collision	0.015	0.015	0.030
Angle collision	0.118	0.167	0.285
Sideswipe	0.043	0.025	0.068
Other multiple-vehicle collision	0.022	0.149	0.171
Subtotal	0.342	0.636	0.978
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.031	0.077	0.108
Collision with other object	0.004	0.008	0.012
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.004	0.003	0.007
Collision with pedestrian	0.023		0.023
Collision with bicycle	0.018		0.018
Subtotal	0.082	0.092	0.174
Total	0.424	0.728	1.152

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.13	0.34	0.47
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.074	0.191	0.265
Head-on collision	0.007	0.001	0.008
Angle collision	0.009	0.019	0.028
Sideswipe, same direction	0.002	0.008	0.010
Sideswipe, opposite direction	0.007	0.013	0.020
Other multiple-vehicle collision	0.003	0.013	0.016
Subtotal	0.108	0.258	0.366
Single-Vehicle Collisions			
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.014	0.063	0.077
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.013	0.018
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.023	0.082	0.105
Total	0.131	0.340	0.471

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.46	0.61	1.06

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.234	0.396
Head-on collision	0.017	0.012	0.029
Angle collision	0.132	0.139	0.271
Sideswipe	0.048	0.021	0.069
Other multiple-vehicle collision	0.025	0.125	0.150
Subtotal	0.384	0.531	0.915
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.026	0.063	0.089
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.016		0.016
Subtotal	0.072	0.075	0.147
Total	0.456	0.606	1.062

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	4
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.29	0.75	1.04
Crash rate (crashes/mi/year)	1.5	3.7	5.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.246	0.584	0.830
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.292	0.749	1.041

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.70	1.20	1.91

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.239	0.463	0.702
Head-on collision	0.026	0.024	0.050
Angle collision	0.194	0.276	0.470
Sideswipe	0.071	0.042	0.113
Other multiple-vehicle collision	0.037	0.247	0.284
Subtotal	0.567	1.052	1.619

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.052	0.126	0.178
Collision with other object	0.006	0.014	0.020
Other single-vehicle collision	0.003	0.003	0.006
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.039		0.039
Collision with bicycle	0.029		0.029
Subtotal	0.136	0.151	0.287
Total	0.703	1.203	1.906

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	3
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.70	0.96
Crash rate (crashes/mi/year)	1.3	3.5	4.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.221	0.530	0.751
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.267	0.695	0.962

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	27000
AADTminor	19000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	4
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.64	3.12	4.77

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.662	1.412	2.074
Head-on collision	0.072	0.088	0.160
Angle collision	0.511	0.713	1.224
Sideswipe	0.146	0.094	0.240
Other multiple-vehicle collision	0.081	0.617	0.698
Subtotal	1.472	2.924	4.396
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.050	0.173	0.223
Collision with other object	0.005	0.014	0.019
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.009	0.007	0.016
Collision with pedestrian	0.033		0.033
Collision with bicycle	0.070		0.070
Subtotal	0.170	0.199	0.369
Total	1.642	3.123	4.765

General Information					
Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data	
Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results			
Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.91
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution			
Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.427	0.589
Head-on collision	0.015	0.002	0.017
Angle collision	0.019	0.043	0.062
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.016	0.030	0.046
Other multiple-vehicle collision	0.006	0.029	0.035
Subtotal	0.221	0.548	0.769
Single-Vehicle Collisions			
Collision with animal	0.001	0.007	0.008
Collision with fixed object	0.015	0.085	0.100
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.018	0.023
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.030	0.111	0.141
Total	0.251	0.659	0.910

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.53	0.78	1.32

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.152	0.261	0.413
Head-on collision	0.018	0.021	0.039
Angle collision	0.198	0.233	0.431
Sideswipe	0.055	0.031	0.086
Other multiple-vehicle collision	0.027	0.151	0.178
Subtotal	0.450	0.697	1.147
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.072	0.094
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.028		0.028
Collision with bicycle	0.023		0.023
Subtotal	0.084	0.085	0.169
Total	0.534	0.782	1.316

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.76	1.98	2.74
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.666	1.647	2.313
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423
Total	0.755	1.981	2.736

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.74	0.99	1.73

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.401	0.672
Head-on collision	0.029	0.021	0.050
Angle collision	0.221	0.239	0.460
Sideswipe	0.081	0.036	0.117
Other multiple-vehicle collision	0.042	0.214	0.256
Subtotal	0.644	0.911	1.555
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.027	0.068	0.095
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.027		0.027
Subtotal	0.097	0.080	0.177
Total	0.741	0.991	1.732

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.78	2.02	2.80
Crash rate (crashes/mi/year)	2.6	6.7	9.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.686	1.689	2.375
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423
Total	0.775	2.023	2.798

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane On-Alignment (2On)	Analysis Date	6/28/2011 3:46 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	29000
AADTminor	25000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	2
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.93	3.65	5.58

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.782	1.651	2.433
Head-on collision	0.085	0.103	0.188
Angle collision	0.603	0.834	1.437
Sideswipe	0.172	0.109	0.281
Other multiple-vehicle collision	0.096	0.721	0.817
Subtotal	1.738	3.418	5.156
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.057	0.200	0.257
Collision with other object	0.006	0.016	0.022
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.011	0.008	0.019
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.082		0.082
Subtotal	0.195	0.229	0.424
Total	1.933	3.647	5.580

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.4
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.32	0.84	1.15
Crash rate (crashes/mi/year)	0.8	2.1	2.9

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.172	0.440	0.612
Head-on collision	0.016	0.002	0.018
Angle collision	0.020	0.045	0.065
Sideswipe, same direction	0.004	0.018	0.022
Sideswipe, opposite direction	0.017	0.031	0.048
Other multiple-vehicle collision	0.007	0.030	0.037
Subtotal	0.236	0.566	0.802
Single-Vehicle Collisions			
Collision with animal	0.002	0.018	0.020
Collision with fixed object	0.051	0.204	0.255
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.017	0.044	0.061
Collision with pedestrian	0.006		0.006
Collision with bicycle	0.005		0.005
Subtotal	0.082	0.269	0.351
Total	0.318	0.835	1.153

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3SG
AADTmajor	18000
AADTminor	13000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.90	1.79	2.69

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.427	0.893	1.320
Head-on collision	0.030	0.033	0.063
Angle collision	0.218	0.334	0.552
Sideswipe	0.059	0.052	0.111
Other multiple-vehicle collision	0.044	0.324	0.368
Subtotal	0.778	1.636	2.414
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.050	0.142	0.192
Collision with other object	0.007	0.011	0.018
Other single-vehicle collision	0.003	0.003	0.006
Single-vehicle noncollision	0.016	0.002	0.018
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.029		0.029
Subtotal	0.119	0.158	0.277
Total	0.897	1.794	2.691

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.5
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.62	1.64	2.26
Crash rate (crashes/mi/year)	1.2	3.3	4.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.366	0.955	1.321
Head-on collision	0.034	0.005	0.039
Angle collision	0.043	0.097	0.140
Sideswipe, same direction	0.008	0.038	0.046
Sideswipe, opposite direction	0.037	0.068	0.105
Other multiple-vehicle collision	0.015	0.065	0.080
Subtotal	0.503	1.228	1.731
Single-Vehicle Collisions			
Collision with animal	0.002	0.027	0.029
Collision with fixed object	0.069	0.313	0.382
Collision with other object	0.001	0.005	0.006
Other single-vehicle collision	0.023	0.067	0.090
Collision with pedestrian	0.011		0.011
Collision with bicycle	0.009		0.009
Subtotal	0.115	0.412	0.527
Total	0.618	1.640	2.258

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.70	1.20	1.91

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.239	0.463	0.702
Head-on collision	0.026	0.024	0.050
Angle collision	0.194	0.276	0.470
Sideswipe	0.071	0.042	0.113
Other multiple-vehicle collision	0.037	0.247	0.284
Subtotal	0.567	1.052	1.619
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.052	0.126	0.178
Collision with other object	0.006	0.014	0.020
Other single-vehicle collision	0.003	0.003	0.006
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.039		0.039
Collision with bicycle	0.029		0.029
Subtotal	0.136	0.151	0.287
Total	0.703	1.203	1.906

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.13	0.34	0.47
Crash rate (crashes/mi/year)	1.3	3.4	4.7

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.074	0.191	0.265
Head-on collision	0.007	0.001	0.008
Angle collision	0.009	0.019	0.028
Sideswipe, same direction	0.002	0.008	0.010
Sideswipe, opposite direction	0.007	0.013	0.020
Other multiple-vehicle collision	0.003	0.013	0.016
Subtotal	0.108	0.258	0.366
Single-Vehicle Collisions			
Collision with animal	0.000	0.005	0.005
Collision with fixed object	0.014	0.063	0.077
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.013	0.018
Collision with pedestrian	0.002		0.002
Collision with bicycle	0.002		0.002
Subtotal	0.023	0.082	0.105
Total	0.131	0.340	0.471

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.46	0.61	1.06

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.234	0.396
Head-on collision	0.017	0.012	0.029
Angle collision	0.132	0.139	0.271
Sideswipe	0.048	0.021	0.069
Other multiple-vehicle collision	0.025	0.125	0.150
Subtotal	0.384	0.531	0.915
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.026	0.063	0.089
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.022		0.022
Collision with bicycle	0.016		0.016
Subtotal	0.072	0.075	0.147
Total	0.456	0.606	1.062

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	3
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.29	0.74	1.02
Crash rate (crashes/mi/year)	1.4	3.7	5.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.240	0.571	0.811
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.286	0.736	1.022

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.70	1.20	1.91

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.239	0.463	0.702
Head-on collision	0.026	0.024	0.050
Angle collision	0.194	0.276	0.470
Sideswipe	0.071	0.042	0.113
Other multiple-vehicle collision	0.037	0.247	0.284
Subtotal	0.567	1.052	1.619
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.052	0.126	0.178
Collision with other object	0.006	0.014	0.020
Other single-vehicle collision	0.003	0.003	0.006
Single-vehicle noncollision	0.007	0.005	0.012
Collision with pedestrian	0.039		0.039
Collision with bicycle	0.029		0.029
Subtotal	0.136	0.151	0.287
Total	0.703	1.203	1.906

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	3
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.27	0.70	0.96
Crash rate (crashes/mi/year)	1.3	3.5	4.8

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.147	0.382	0.529
Head-on collision	0.014	0.002	0.016
Angle collision	0.017	0.039	0.056
Sideswipe, same direction	0.003	0.015	0.018
Sideswipe, opposite direction	0.015	0.027	0.042
Other multiple-vehicle collision	0.006	0.026	0.032
Subtotal	0.221	0.530	0.751
Single-Vehicle Collisions			
Collision with animal	0.001	0.011	0.012
Collision with fixed object	0.027	0.125	0.152
Collision with other object	0.000	0.002	0.002
Other single-vehicle collision	0.009	0.027	0.036
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.046	0.165	0.211
Total	0.267	0.695	0.962

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	27000
AADTminor	19000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	4
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.65	3.12	4.77

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.662	1.412	2.074
Head-on collision	0.072	0.088	0.160
Angle collision	0.511	0.713	1.224
Sideswipe	0.146	0.094	0.240
Other multiple-vehicle collision	0.081	0.617	0.698
Subtotal	1.472	2.924	4.396
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.050	0.173	0.223
Collision with other object	0.005	0.014	0.019
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.009	0.007	0.016
Collision with pedestrian	0.037		0.037
Collision with bicycle	0.070		0.070
Subtotal	0.174	0.199	0.373
Total	1.646	3.123	4.769

General Information					
Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data	
Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results			
Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.91
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution			
Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.427	0.589
Head-on collision	0.015	0.002	0.017
Angle collision	0.019	0.043	0.062
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.016	0.030	0.046
Other multiple-vehicle collision	0.006	0.029	0.035
Subtotal	0.221	0.548	0.769
Single-Vehicle Collisions			
Collision with animal	0.001	0.007	0.008
Collision with fixed object	0.015	0.085	0.100
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.018	0.023
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.030	0.111	0.141
Total	0.251	0.659	0.910

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.53	0.78	1.32

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.152	0.261	0.413
Head-on collision	0.018	0.021	0.039
Angle collision	0.198	0.233	0.431
Sideswipe	0.055	0.031	0.086
Other multiple-vehicle collision	0.027	0.151	0.178
Subtotal	0.450	0.697	1.147

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.072	0.094
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.028		0.028
Collision with bicycle	0.023		0.023
Subtotal	0.084	0.085	0.169
Total	0.534	0.782	1.316

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.76	1.98	2.74
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.666	1.647	2.313
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423
Total	0.755	1.981	2.736

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.74	0.99	1.73

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.401	0.672
Head-on collision	0.029	0.021	0.050
Angle collision	0.221	0.239	0.460
Sideswipe	0.081	0.036	0.117
Other multiple-vehicle collision	0.042	0.214	0.256
Subtotal	0.644	0.911	1.555

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.027	0.068	0.095
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.027		0.027
Subtotal	0.097	0.080	0.177
Total	0.741	0.991	1.732

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	2
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.78	2.02	2.80
Crash rate (crashes/mi/year)	2.6	6.7	9.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.686	1.689	2.375
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423

Total	0.775	2.023	2.798
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General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane County D to County X (2DX)	Analysis Date	7/6/2011 1:33 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	29000
AADTminor	25000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	2
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.93	3.65	5.58

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.782	1.651	2.433
Head-on collision	0.085	0.103	0.188
Angle collision	0.603	0.834	1.437
Sideswipe	0.172	0.109	0.281
Other multiple-vehicle collision	0.096	0.721	0.817
Subtotal	1.738	3.418	5.156
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.057	0.200	0.257
Collision with other object	0.006	0.016	0.022
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.011	0.008	0.019
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.082		0.082
Subtotal	0.195	0.229	0.424
Total	1.933	3.647	5.580

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane Pebble Creek (2PC)	Analysis Date	6/28/2011 3:29 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.5
AADT (veh/day)	14000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.44	1.16	1.59
Crash rate (crashes/mi/year)	0.9	2.3	3.2

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.242	0.625	0.867
Head-on collision	0.023	0.003	0.026
Angle collision	0.028	0.063	0.091
Sideswipe, same direction	0.005	0.025	0.030
Sideswipe, opposite direction	0.024	0.044	0.068
Other multiple-vehicle collision	0.010	0.043	0.053
Subtotal	0.332	0.803	1.135
Single-Vehicle Collisions			
Collision with animal	0.002	0.023	0.025
Collision with fixed object	0.065	0.267	0.332
Collision with other object	0.001	0.005	0.006
Other single-vehicle collision	0.022	0.057	0.079
Collision with pedestrian	0.008		0.008
Collision with bicycle	0.006		0.006
Subtotal	0.104	0.352	0.456
Total	0.436	1.155	1.591

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane Pebble Creek (2PC)	Analysis Date	6/28/2011 3:29 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	14000
AADTminor	10000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.72	1.45	2.16

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.277	0.647	0.924
Head-on collision	0.030	0.040	0.070
Angle collision	0.214	0.327	0.541
Sideswipe	0.061	0.043	0.104
Other multiple-vehicle collision	0.034	0.283	0.317
Subtotal	0.616	1.340	1.956
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.032	0.092	0.124
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.032		0.032
Subtotal	0.101	0.105	0.206
Total	0.717	1.445	2.162

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane Pebble Creek (2PC)	Analysis Date	6/28/2011 3:29 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.7
AADT (veh/day)	14000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	10
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	1
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.63	1.67	2.30
Crash rate (crashes/mi/year)	0.9	2.4	3.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.338	0.874	1.212
Head-on collision	0.031	0.004	0.035
Angle collision	0.039	0.089	0.128
Sideswipe, same direction	0.007	0.035	0.042
Sideswipe, opposite direction	0.034	0.062	0.096
Other multiple-vehicle collision	0.013	0.060	0.073
Subtotal	0.487	1.176	1.663
Single-Vehicle Collisions			
Collision with animal	0.003	0.032	0.035
Collision with fixed object	0.091	0.373	0.464
Collision with other object	0.001	0.006	0.007
Other single-vehicle collision	0.030	0.080	0.110
Collision with pedestrian	0.011		0.011
Collision with bicycle	0.009		0.009
Subtotal	0.145	0.491	0.636
Total	0.632	1.667	2.299

General Information

Analyst	Matt Tronnes	Analysis Name	Reconstructed Two-Lane Pebble Creek (2PC)	Analysis Date	6/28/2011 3:29 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	22000
AADTminor	14000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	4
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	5
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.22	2.37	3.59

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.487	1.066	1.553
Head-on collision	0.053	0.066	0.119
Angle collision	0.376	0.539	0.915
Sideswipe	0.107	0.071	0.178
Other multiple-vehicle collision	0.060	0.466	0.526
Subtotal	1.083	2.208	3.291
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.042	0.137	0.179
Collision with other object	0.004	0.011	0.015
Other single-vehicle collision	0.002	0.004	0.006
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.030		0.030
Collision with bicycle	0.053		0.053
Subtotal	0.139	0.157	0.296
Total	1.222	2.365	3.587

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.4
AADT (veh/day)	13000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.67	0.92
Crash rate (crashes/mi/year)	0.6	1.7	2.3

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.165	0.320	0.485
Head-on collision	0.004	0.003	0.007
Angle collision	0.008	0.017	0.025
Sideswipe, same direction	0.010	0.108	0.118
Sideswipe, opposite direction	0.002	0.000	0.002
Other multiple-vehicle collision	0.010	0.034	0.044
Subtotal	0.199	0.482	0.681
Single-Vehicle Collisions			
Collision with animal	0.000	0.012	0.012
Collision with fixed object	0.017	0.150	0.167
Collision with other object	0.001	0.003	0.004
Other single-vehicle collision	0.016	0.020	0.036
Collision with pedestrian	0.017		0.017
Collision with bicycle	0.004		0.004
Subtotal	0.055	0.185	0.240
Total	0.254	0.667	0.921

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3SG
AADTmajor	18000
AADTminor	13000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	2
Number of approaches with right-turn lanes	2
Number of approaches with left-turn signal phasing	0
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.90	1.79	2.69

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.427	0.893	1.320
Head-on collision	0.030	0.033	0.063
Angle collision	0.218	0.334	0.552
Sideswipe	0.059	0.052	0.111
Other multiple-vehicle collision	0.044	0.324	0.368
Subtotal	0.778	1.636	2.414

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.050	0.142	0.192
Collision with other object	0.007	0.011	0.018
Other single-vehicle collision	0.003	0.003	0.006
Single-vehicle noncollision	0.016	0.002	0.018
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.029		0.029
Subtotal	0.119	0.158	0.277
Total	0.897	1.794	2.691

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.5
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.47	1.22	1.68
Crash rate (crashes/mi/year)	0.9	2.4	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.312	0.630	0.942
Head-on collision	0.008	0.007	0.015
Angle collision	0.015	0.034	0.049
Sideswipe, same direction	0.019	0.212	0.231
Sideswipe, opposite direction	0.004	0.001	0.005
Other multiple-vehicle collision	0.018	0.068	0.086
Subtotal	0.376	0.952	1.328
Single-Vehicle Collisions			
Collision with animal	0.000	0.017	0.017
Collision with fixed object	0.026	0.215	0.241
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.024	0.029	0.053
Collision with pedestrian	0.031		0.031
Collision with bicycle	0.008		0.008
Subtotal	0.090	0.265	0.355
Total	0.466	1.217	1.683

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.47	0.81	1.28

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.161	0.312	0.473
Head-on collision	0.017	0.016	0.033
Angle collision	0.131	0.186	0.317
Sideswipe	0.048	0.028	0.076
Other multiple-vehicle collision	0.025	0.167	0.192
Subtotal	0.382	0.709	1.091
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.035	0.085	0.120
Collision with other object	0.004	0.009	0.013
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.005	0.003	0.008
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.020		0.020
Subtotal	0.092	0.101	0.193
Total	0.474	0.810	1.284

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.1
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.10	0.24	0.34
Crash rate (crashes/mi/year)	1.0	2.4	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.062	0.126	0.188
Head-on collision	0.002	0.001	0.003
Angle collision	0.003	0.007	0.010
Sideswipe, same direction	0.004	0.042	0.046
Sideswipe, opposite direction	0.001	0.000	0.001
Other multiple-vehicle collision	0.004	0.013	0.017
Subtotal	0.076	0.189	0.265
Single-Vehicle Collisions			
Collision with animal	0.000	0.003	0.003
Collision with fixed object	0.006	0.042	0.048
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.006	0.011
Collision with pedestrian	0.006		0.006
Collision with bicycle	0.002		0.002
Subtotal	0.019	0.052	0.071
Total	0.095	0.241	0.336

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.31	0.41	0.72

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.109	0.158	0.267
Head-on collision	0.012	0.008	0.020
Angle collision	0.089	0.094	0.183
Sideswipe	0.033	0.014	0.047
Other multiple-vehicle collision	0.017	0.084	0.101
Subtotal	0.260	0.358	0.618
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.018	0.042	0.060
Collision with other object	0.002	0.005	0.007
Other single-vehicle collision	0.001	0.001	0.002
Single-vehicle noncollision	0.002	0.002	0.004
Collision with pedestrian	0.015		0.015
Collision with bicycle	0.011		0.011
Subtotal	0.049	0.051	0.100
Total	0.309	0.409	0.718

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	1
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.19	0.50	0.69
Crash rate (crashes/mi/year)	1.0	2.5	3.5

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.125	0.252	0.377
Head-on collision	0.003	0.003	0.006
Angle collision	0.006	0.014	0.020
Sideswipe, same direction	0.008	0.085	0.093
Sideswipe, opposite direction	0.002	0.000	0.002
Other multiple-vehicle collision	0.007	0.027	0.034
Subtotal	0.156	0.393	0.549
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.011	0.086	0.097
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.010	0.011	0.021
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.003		0.003
Subtotal	0.038	0.106	0.144
Total	0.194	0.499	0.693

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	18000
AADTminor	2000
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	1
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.47	0.81	1.28

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.161	0.312	0.473
Head-on collision	0.017	0.016	0.033
Angle collision	0.131	0.186	0.317
Sideswipe	0.048	0.028	0.076
Other multiple-vehicle collision	0.025	0.167	0.192
Subtotal	0.382	0.709	1.091
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.035	0.085	0.120
Collision with other object	0.004	0.009	0.013
Other single-vehicle collision	0.002	0.002	0.004
Single-vehicle noncollision	0.005	0.003	0.008
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.020		0.020
Subtotal	0.092	0.101	0.193
Total	0.474	0.810	1.284

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.2
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	1
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.19	0.49	0.68
Crash rate (crashes/mi/year)	1.0	2.4	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.125	0.252	0.377
Head-on collision	0.003	0.003	0.006
Angle collision	0.006	0.014	0.020
Sideswipe, same direction	0.008	0.085	0.093
Sideswipe, opposite direction	0.002	0.000	0.002
Other multiple-vehicle collision	0.007	0.027	0.034
Subtotal	0.152	0.384	0.536
Single-Vehicle Collisions			
Collision with animal	0.000	0.007	0.007
Collision with fixed object	0.011	0.086	0.097
Collision with other object	0.001	0.002	0.003
Other single-vehicle collision	0.010	0.011	0.021
Collision with pedestrian	0.013		0.013
Collision with bicycle	0.003		0.003
Subtotal	0.038	0.106	0.144
Total	0.190	0.490	0.680

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	27000
AADTminor	19000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	4
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	5
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	1-8
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.65	3.12	4.77

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.662	1.412	2.074
Head-on collision	0.072	0.088	0.160
Angle collision	0.511	0.713	1.224
Sideswipe	0.146	0.094	0.240
Other multiple-vehicle collision	0.081	0.617	0.698
Subtotal	1.472	2.924	4.396

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.050	0.173	0.223
Collision with other object	0.005	0.014	0.019
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.009	0.007	0.016
Collision with pedestrian	0.039		0.039
Collision with bicycle	0.070		0.070
Subtotal	0.176	0.199	0.375
Total	1.648	3.123	4.771

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.1
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	15
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.25	0.66	0.91
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.162	0.427	0.589
Head-on collision	0.015	0.002	0.017
Angle collision	0.019	0.043	0.062
Sideswipe, same direction	0.003	0.017	0.020
Sideswipe, opposite direction	0.016	0.030	0.046
Other multiple-vehicle collision	0.006	0.029	0.035
Subtotal	0.221	0.548	0.769
Single-Vehicle Collisions			
Collision with animal	0.001	0.007	0.008
Collision with fixed object	0.015	0.085	0.100
Collision with other object	0.000	0.001	0.001
Other single-vehicle collision	0.005	0.018	0.023
Collision with pedestrian	0.005		0.005
Collision with bicycle	0.004		0.004
Subtotal	0.030	0.111	0.141
Total	0.251	0.659	0.910

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	2
Number of major-road approaches with right-turn lanes	2

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.53	0.78	1.32

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.152	0.261	0.413
Head-on collision	0.018	0.021	0.039
Angle collision	0.198	0.233	0.431
Sideswipe	0.055	0.031	0.086
Other multiple-vehicle collision	0.027	0.151	0.178
Subtotal	0.450	0.697	1.147
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.002	0.002
Collision with fixed object	0.022	0.072	0.094
Collision with other object	0.003	0.006	0.009
Other single-vehicle collision	0.002	0.001	0.003
Single-vehicle noncollision	0.006	0.004	0.010
Collision with pedestrian	0.028		0.028
Collision with bicycle	0.023		0.023
Subtotal	0.084	0.085	0.169
Total	0.534	0.782	1.316

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	2U
Length of segment, L (mi)	0.3
AADT (veh/day)	29000
Type of on-street parking	None
Land use	Commercial/Industrial/ Institutional
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.76	1.98	2.74
Crash rate (crashes/mi/year)	2.5	6.6	9.1

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.486	1.281	1.767
Head-on collision	0.045	0.007	0.052
Angle collision	0.057	0.130	0.187
Sideswipe, same direction	0.010	0.051	0.061
Sideswipe, opposite direction	0.049	0.091	0.140
Other multiple-vehicle collision	0.019	0.087	0.106
Subtotal	0.666	1.647	2.313
Single-Vehicle Collisions			
Collision with animal	0.002	0.022	0.024
Collision with fixed object	0.046	0.254	0.300
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.015	0.054	0.069
Collision with pedestrian	0.014		0.014
Collision with bicycle	0.011		0.011
Subtotal	0.089	0.334	0.423
Total	0.755	1.981	2.736

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	3ST
AADTmajor	29000
AADTminor	500
Intersection Lighting	Not Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	1

Data for signalized intersections only:

Number of approaches with left-turn lanes	0
Number of approaches with right-turn lanes	0
Number of approaches with left-turn signal phasing	
Type of left-turn signal phasing	Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	
Maximum number of lanes crossed by a pedestrian	
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.74	0.99	1.73

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.271	0.401	0.672
Head-on collision	0.029	0.021	0.050
Angle collision	0.221	0.239	0.460
Sideswipe	0.081	0.036	0.117
Other multiple-vehicle collision	0.042	0.214	0.256
Subtotal	0.644	0.911	1.555
Single-Vehicle Collisions			
Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.001	0.001
Collision with fixed object	0.027	0.068	0.095
Collision with other object	0.003	0.007	0.010
Other single-vehicle collision	0.001	0.002	0.003
Single-vehicle noncollision	0.004	0.002	0.006
Collision with pedestrian	0.035		0.035
Collision with bicycle	0.027		0.027
Subtotal	0.097	0.080	0.177
Total	0.741	0.991	1.732

General Information					
Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data		Summary Results			
Road type	2U	Collision Type	Fatal and Injury	Property Damage Only	Total
Length of segment, L (mi)	0.3	Total	0.78	2.02	2.80
AADT (veh/day)	29000	Crash rate (crashes/mi/year)	2.6	6.7	9.3
Type of on-street parking	None	Crash Severity Distribution			
Land use	Residential/Other	Collision Type	Fatal and Injury	Property Damage Only	Total
Curb length with on-street parking		Multiple-Vehicle Collisions			
Median width (ft)	10	Rear-end collision	0.486	1.281	1.767
Lighting	Not Present	Head-on collision	0.045	0.007	0.052
Automated speed enforcement	Not Present	Angle collision	0.057	0.130	0.187
Major commercial driveways	0	Sideswipe, same direction	0.010	0.051	0.061
Minor commercial driveways	0	Sideswipe, opposite direction	0.049	0.091	0.140
Major industrial/institutional driveways	0	Other multiple-vehicle collision	0.019	0.087	0.106
Minor industrial/institutional driveways	0	Subtotal	0.686	1.689	2.375
Major residential driveways	0	Single-Vehicle Collisions			
Minor residential driveways	2	Collision with animal	0.002	0.022	0.024
Other driveways	0	Collision with fixed object	0.046	0.254	0.300
Speed Category	31	Collision with other object	0.001	0.004	0.005
Roadside fixed object density (fixed objects/mi)	1	Other single-vehicle collision	0.015	0.054	0.069
Offset to roadside fixed objects (ft)	30	Collision with pedestrian	0.014		0.014
Calibration Factor, Cr	1.00	Collision with bicycle	0.011		0.011
		Subtotal	0.089	0.334	0.423
		Total	0.775	2.023	2.798

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane County D to County X (4DX)	Analysis Date	6/28/2011 3:00 PM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section - 2035 No Build volumes used.
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	29000
AADTminor	25000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	2
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	3
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.93	3.65	5.58

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.782	1.651	2.433
Head-on collision	0.085	0.103	0.188
Angle collision	0.603	0.834	1.437
Sideswipe	0.172	0.109	0.281
Other multiple-vehicle collision	0.096	0.721	0.817
Subtotal	1.738	3.418	5.156

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.057	0.200	0.257
Collision with other object	0.006	0.016	0.022
Other single-vehicle collision	0.003	0.005	0.008
Single-vehicle noncollision	0.011	0.008	0.019
Collision with pedestrian	0.036		0.036
Collision with bicycle	0.082		0.082
Subtotal	0.195	0.229	0.424
Total	1.933	3.647	5.580

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane Pebble Creek (4PC)	Analysis Date	6/28/2011 11:47 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.5
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	0
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.47	1.22	1.68
Crash rate (crashes/mi/year)	0.9	2.4	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.312	0.630	0.942
Head-on collision	0.008	0.007	0.015
Angle collision	0.015	0.034	0.049
Sideswipe, same direction	0.019	0.212	0.231
Sideswipe, opposite direction	0.004	0.001	0.005
Other multiple-vehicle collision	0.018	0.068	0.086
Subtotal	0.376	0.952	1.328
Single-Vehicle Collisions			
Collision with animal	0.000	0.017	0.017
Collision with fixed object	0.026	0.215	0.241
Collision with other object	0.001	0.004	0.005
Other single-vehicle collision	0.024	0.029	0.053
Collision with pedestrian	0.031		0.031
Collision with bicycle	0.008		0.008
Subtotal	0.090	0.265	0.355
Total	0.466	1.217	1.683

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane Pebble Creek (4PC)	Analysis Date	6/28/2011 11:47 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	18000
AADTminor	10000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	2
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	4
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.93	1.82	2.75

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.366	0.819	1.185
Head-on collision	0.040	0.051	0.091
Angle collision	0.282	0.414	0.696
Sideswipe	0.080	0.054	0.134
Other multiple-vehicle collision	0.045	0.358	0.403
Subtotal	0.813	1.696	2.509

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.036	0.110	0.146
Collision with other object	0.003	0.009	0.012
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.007	0.004	0.011
Collision with pedestrian	0.026		0.026
Collision with bicycle	0.040		0.040
Subtotal	0.114	0.126	0.240
Total	0.927	1.822	2.749

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane Pebble Creek (4PC)	Analysis Date	6/28/2011 11:47 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Road type	4D
Length of segment, L (mi)	0.7
AADT (veh/day)	18000
Type of on-street parking	None
Land use	Residential/Other
Curb length with on-street parking	
Median width (ft)	20
Lighting	Not Present
Automated speed enforcement	Not Present
Major commercial driveways	0
Minor commercial driveways	0
Major industrial/institutional driveways	0
Minor industrial/institutional driveways	0
Major residential driveways	1
Minor residential driveways	0
Other driveways	0
Speed Category	31
Roadside fixed object density (fixed objects/mi)	1
Offset to roadside fixed objects (ft)	30
Calibration Factor, Cr	1.00

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	0.66	1.72	2.38
Crash rate (crashes/mi/year)	0.9	2.5	3.4

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
Multiple-Vehicle Collisions			
Rear-end collision	0.438	0.881	1.319
Head-on collision	0.011	0.009	0.020
Angle collision	0.021	0.048	0.069
Sideswipe, same direction	0.026	0.297	0.323
Sideswipe, opposite direction	0.005	0.001	0.006
Other multiple-vehicle collision	0.025	0.095	0.120
Subtotal	0.532	1.347	1.879
Single-Vehicle Collisions			
Collision with animal	0.000	0.023	0.023
Collision with fixed object	0.037	0.301	0.338
Collision with other object	0.002	0.006	0.008
Other single-vehicle collision	0.035	0.040	0.075
Collision with pedestrian	0.044		0.044
Collision with bicycle	0.012		0.012
Subtotal	0.130	0.370	0.500
Total	0.662	1.717	2.379

General Information

Analyst	Matt Tronnes	Analysis Name	Four-Lane Pebble Creek (4PC)	Analysis Date	6/28/2011 11:47 AM
Agency	Strand Associates, Inc.	Project Number	1089.286	Comments	South Section
State	Wisconsin	Highway			
Region/Area	SE Region	Jurisdiction			

Input Data

Intersection type	4SG
AADTmajor	19000
AADTminor	18000
Intersection Lighting	Present
Calibration factor, Ci	1.00

Data for unsignalized intersections only:

Number of major-road approaches with left-turn lanes	0
Number of major-road approaches with right-turn lanes	0

Data for signalized intersections only:

Number of approaches with left-turn lanes	4
Number of approaches with right-turn lanes	4
Number of approaches with left-turn signal phasing	4
Type of left-turn signal phasing	Protected Permissive
Intersection red light cameras	Not Present
Sum of all pedestrian crossing volumes	50
Maximum number of lanes crossed by a pedestrian	5
Number of bus stops within 1,000ft of the intersection	0
Schools within 1,000ft of the intersection	Not Present
Number of alcohol sale establishments within 1,000ft	0
Number of approaches for which RTOR is prohibited	0

Summary Results

Collision Type	Fatal and Injury	Property Damage Only	Total
Total	1.10	2.17	3.27

Crash Severity Distribution

Collision Type	Fatal and Injury	Property Damage Only	Total
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Multiple-Vehicle Collisions

Rear-end collision	0.433	0.975	1.408
Head-on collision	0.047	0.061	0.108
Angle collision	0.334	0.492	0.826
Sideswipe	0.095	0.065	0.160
Other multiple-vehicle collision	0.053	0.426	0.479
Subtotal	0.962	2.019	2.981

Single-Vehicle Collisions

Collision with parked vehicle	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000
Collision with fixed object	0.042	0.130	0.172
Collision with other object	0.004	0.010	0.014
Other single-vehicle collision	0.002	0.003	0.005
Single-vehicle noncollision	0.008	0.005	0.013
Collision with pedestrian	0.034		0.034
Collision with bicycle	0.048		0.048
Subtotal	0.138	0.148	0.286
Total	1.100	2.167	3.267

COORDINATION PLAN

For

AGENCY AND PUBLIC INVOLVEMENT

As part of the Environmental Review Process for
West Waukesha Bypass
I-94 to WIS 59
Waukesha County, WI
WisDOT Project I.D. 2788-01-00



U.S. Department of Transportation
Federal Highway Administration



Wisconsin Department of Transportation



Waukesha County Department of Public Works

Previous Version May 2010
(Update #1 February 2012)

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Revision History

This Coordination Plan for Agency and Public Involvement (“Coordination Plan”) is intended to be a dynamic document that will be available to stakeholders and updated as appropriate throughout the duration of the project. Below is a record of substantive changes made to this document.

The Lead Agencies will make the Coordination Plan available to other agencies and the public in the ways identified in Section 1.1. The Coordination Plan will be revised when important agency contact information changes (Table 2.3), when important coordination activities or actions described in the Plan change, or when the project schedule substantially changes (Table 4.1). Revisions and changes to the Plan will be communicated to agencies in a timely manner and shared with the public in ways identified in Section 1.1. Revisions or changes that impact Plan commitments made by other agencies must be agreeable to the affected agencies. Other revisions and changes to the Plan, not affecting commitments made by other agencies, will be forwarded to Cooperating and Participating Agencies for their acknowledgement and comment.

Coordination Plan Version	Date of Change	Revision Description
Original Version May 2010	February 2012	Section 2.3 (Table 2.3)—Updated agency contact list and coordination/participating agency status Section 4.1 (Table 4.1)—Updated project schedule Section 7, (Table 7.1) —Updated list of project meetings

Section 1: Introduction

1.1 Purpose of Coordination Plan

This project's environmental review process must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The purpose of this Coordination Plan is to communicate how and when the lead agencies will coordinate public and agency participation and comment in the environmental review process for the West Waukesha Bypass project.

This Coordination Plan outlines how the lead agencies have divided responsibilities for compliance with various aspects of the environmental review process such as the issuance of invitation letters, and how the lead agencies will provide opportunities for input from the public and other agencies. The Coordination Plan also identifies concurrence points and project milestones, and establishes a schedule of meetings and timeframes for input and review by the Participating and Cooperating Agencies, as well as by the public, Indian Tribes of Wisconsin and other Tribal interests.

This plan will be shared with the Federal, State, and local agencies, local units of government, and Indian Tribes who have expressed interest in the proposed project. Copies of the draft Coordination Plan will be sent to the interested parties for review and comment. A copy of the completed Coordination plan will be shared with the public through the project website, at public information meetings, or by request. The Plan will be updated as necessary to reflect substantive changes to information contained in the Plan. Any changes will be documented in the Plan, agencies will have updated copies sent to them, and the public will be notified through the project website, at public information meetings, or by request.

This Coordination Plan is prepared and implemented to establish an environmental review process that conforms to requirements of the National Environmental Policy Act (NEPA), and specifically to comply with Section 6002 of the 2005 federal transportation bill, *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU).

1.2 Project Background

Waukesha County, in cooperation with the Federal Highway Administration (FHWA) and the Wisconsin Department of Transportation (WisDOT), will prepare an Environmental Impact Statement (EIS) for transportation improvements between IH-94 and WIS 59 on the west side of the City of Waukesha. The transportation improvements are being proposed to address growing local and regional traffic volumes, and to enhance traffic flow and safety. The objective is to provide a north-south link between IH-94 and WIS 59 that will complete the existing partial circumferential "beltline" around the City of Waukesha.

Several regional land use and transportation system plans prepared by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) have included a West Waukesha Bypass. Most recently, the 2035 Regional Transportation System Plan for Southeastern Wisconsin (Planning Report 49, June 2006) includes a bypass corridor between I-94 and WIS 59 that would use a combination of Meadowbrook Road/Merrill Hills Road to a point north of Sunset Drive where it would then be on new alignment to the WIS 59 intersection with County X.

The regional planning process considers the potential of more efficient land use and expanded public transit, systems management, bicycle and pedestrian facilities, and demand management to first alleviate traffic congestion (a transportation system management plan). Highway improvements, such as the recommended West Waukesha Bypass, were only then considered to address any residual congestion. As a result the EIS for this study will incorporate, by reference, the modal evaluation of the regional planning process.

Waukesha County plans and the official map for the City of Waukesha also include this same bypass alignment. Waukesha County's official map shows this alignment as a result of a study in 1990-1991 that assessed the need for the West Waukesha Bypass and reviewed several different alignments before ultimately selecting the Meadowbrook Road/Merrill Hills Road alignment.

The EIS will evaluate alternatives for providing a north-south arterial highway between IH-94 and WIS 59 using a combination of existing highways and new alignments. It will also evaluate a no build alternative. The EIS, prepared under NEPA, is a full disclosure document that details how the project was developed. It includes project purpose and need, alternatives considered, description of the affected environment, environmental consequences of the proposed action, and the result of coordination with agencies and the public. The EIS also demonstrates compliance with other applicable environmental laws and regulations and is made available for review by agencies and the public.

If a build alternative is selected at the conclusion of the EIS process, a new roadway link between IH-94 and WIS 59 is anticipated to be designated as a State Trunk Highway. Design and construction would be done as a joint effort by the City of Waukesha, Waukesha County, and WisDOT.

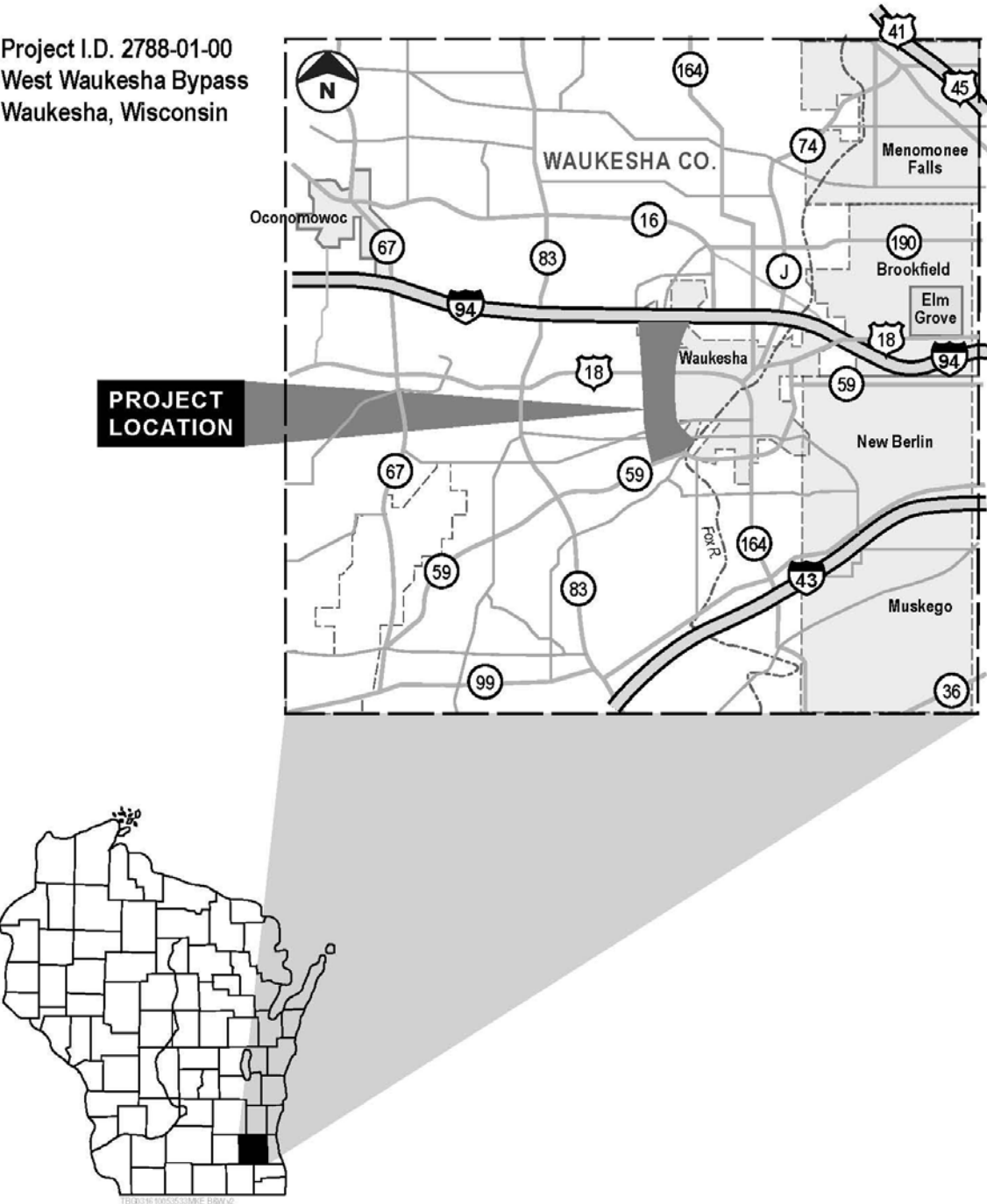
1.3 Agency Coordination Prior to the Coordination Plan

The initial draft Coordination Plan was distributed to local officials and state review agencies on May 25, 2010, to federal review agencies on June 8, 2010, and to Native American Tribes on June 15, 2010 along with invitations to become participating or cooperating agencies in the environmental process for the West Waukesha Bypass study. Agency coordination prior to distribution of the Coordination Plan included the following:

- Waukesha County assembled a community sensitive solutions (CSS) advisory committee made up of residents, business owners, community groups, and local, state and federal agency representatives. The committee met in March and May 2010 to discuss preliminary aspects of the West Waukesha Bypass corridor study. Representatives from the Wisconsin Department of Natural Resources (DNR) and U.S. Army Corps of Engineers (USACE) attended the March, 2010 meeting and a representative from the USACE attended the May, 2010 meeting.
- Waukesha County met with DNR and the WisDOT SE Region wetland ecologist in March, 2010 to brief them on the bypass study, to discuss the Pebble Creek corridor, and to discuss potential threatened and endangered species that may be present in the study area.

1.4 Project Vicinity Map

Project Location



Section 2: Agency Roles – Lead/Cooperating/Participating

2.1 Agency Definitions and Responsibilities

The standard responsibilities for each Lead, Cooperating, and Participating Agency invited to participate in the environmental review process for this project are as follows:

Lead Agency: USDOT-Federal Highway Administration (FHWA) is the Federal Lead Agency. The Wisconsin Department of Transportation (WisDOT) and Waukesha County are the Joint Lead Agencies for this project. Joint Lead Agencies are responsible for managing the environmental review and documentation process, preparing the EIS, and providing opportunities for public and Participating/Cooperating Agency involvement.

As the Federal Lead Agency, FHWA will invite other affected or interested federal agencies and Native American Tribes to participate in the project's environmental review process. WisDOT and Waukesha County as Joint Lead Agencies can invite other affected or interested state and local agencies to participate in the process. The Joint Lead Agencies are responsible for investigating project alternatives, implementing the environmental review process and preparing the environmental document. FHWA must oversee the environmental review process and concur that the process, as implemented by the Joint Lead Agencies satisfies applicable federal laws and guidance.

Waukesha County is responsible for conducting the West Waukesha Bypass Study and for preparing the EIS in consultation with FHWA and WisDOT.

Cooperating Agency: Means any federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative. A State or local agency of similar qualifications or, when the effects are on lands of tribal interest, a Native American Tribe may, by agreement with the lead agencies, also become a Cooperating Agency.

Cooperating Agencies shall use their knowledge and expertise to assist the lead agencies in identifying issues of concern regarding the project's potential impacts, and provide meaningful and timely input throughout the environmental review process. A Cooperating Agency's failure to respond in a timely manner will be indication that the Lead Agencies have fulfilled the coordination step with the agency for that issue. Cooperating Agencies may adopt the Lead Agency's final environmental document to fulfill their environmental documentation requirements for issuing permits or other approvals. Agencies invited to be Cooperating Agencies for the West Waukesha Bypass Study are identified in Table 2.3.

Participating Agency: Participating Agencies include federal, state or local agencies that have an interest in the project. These agencies agree to identify issues of concern regarding the project's potential impacts, and provide meaningful and timely input on purpose and need, range of alternatives, and impact analysis methodologies. Agencies invited to be Participating Agencies for the West Waukesha Bypass Study are identified in Table 2.3.

2.2 DOT-DNR Cooperative Agreement

Chapter 30 of the Wisconsin Statutes (Navigable Waters, Harbors and Navigation), Section 30.2022 (Activities of Department of Transportation) establishes an alternative process for the Wisconsin Department of Transportation and the Wisconsin Department of Natural Resources to interact on State transportation projects. State transportation projects are coordinated with and reviewed by DNR through interdepartmental liaison procedures under the Cooperative Agreement between the Wisconsin Department of Natural Resources and Wisconsin Department of Transportation. The Cooperative Agreement process engages both agencies in progressive discussions and reviews throughout development of transportation projects and culminates in a "concurrence letter" from DNR at the conclusion of final design activities. Coordination with and concurrence from DNR during this project's environmental review process precedes and supplements DNR's review and concurrence role during the final design process. WisDOT will not commence construction activities until DNR concurrence on final design is received.

Nothing in this Coordination Plan or in the SAFETEA-LU coordination process is designed or intended to replace or supplant the steps, activities or expectations expressed in the DOT-DNR Cooperative Agreement, nor does participation in this environmental review process in any way affect DNR's need or ability to perform review and provide concurrence during final design activities.

2.3 List of Agencies, Contacts, and Roles

The intent of coordination with federal, state, and local agencies as well as interested Tribes is to cooperatively identify important environmental or cultural resources and potential impacts and to resolve issues that could delay the environmental process or that could result in denial of approvals required to implement the proposed project. A more complete list of agency expectations is included in Section 3.1.

The agencies and Native American Tribes listed in Table 2.3 were identified as Lead agencies and potential Cooperating or Participating agencies for purposes of the West Waukesha Bypass environmental process. Invitations to become Cooperating or Participating agencies were sent to local officials by Waukesha County on May 25, 2010, to state review agencies by WisDOT on May 25, 2010, to federal review agencies by FHWA on June 8, 2010, and to Native American Tribes by FHWA on June 15, 2010. The status of agency responses to these invitations is noted in Table 2.3. Additional agencies can be invited and added to the list of participants at any time, as appropriate.

Table 2.3

Agency Name	Contact Person Name/Address/Phone Number	Project Role
Federal Agencies		
Federal Highway Administration (FHWA)	Mark Chandler 525 Junction Road, Suite 8000 Madison, WI 53717 (608) 829-7514 Mark.Chandler@dot.gov	Federal Lead Agency
U.S. Army Corps of Engineers (USACE)	Rebecca Graser 20711 Watertown Road, Suite F Waukesha, WI 53186 (262) 717-9531 Rebecca.M.Graser@usace.army.mil	Cooperating Agency (accepted 6/28/10)
U.S. Fish and Wildlife Service (US Fish & Wildlife)	Louise Clemency 2661 Scott tower Drive New Franken, WI 54229 (920) 866-1717 Louise_Clemency@fws.gov	Participating Agency (declined 8/24/10)
U.S. Environmental Protection Agency (USEPA)	Kenneth Westlake NEPA Implementation Section (Mail Code E-19) 77 W. Jackson Blvd. Chicago, IL 60604 (312) 886-2910 Westlake.Kenneth@epa.gov	Participating Agency (accepted 7/2/10)
U.S. Environmental Protection Agency (USEPA)	Kathleen Kowal NEPA Implementation Section (Mail Code E-19) 77 W. Jackson Blvd. Chicago, IL 60604 (312) 353-5206 Kowal.Kathleen@epa.gov	Participating Agency (accepted 7/2/10)
U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)	Patrick Murphy 8030 Excelsior Drive, Suite 200 Madison, WI 53717 (608) 662-4422 Pat.murphy@wi.usda.gov	Participating Agency (no response)

Agency Name	Contact Person Name/Address/Phone Number	Project Role
Bureau of Indian Affairs	Richard Berg 1 Federal Drive Minneapolis, MN 55111 (612) 373-1000	Participating Agency (no response)
State Agencies		
Wisconsin Department of Transportation (WisDOT)	Doug Cain 141 NW Barstow St PO Box 798 Waukesha, WI 53187 (262) 548-5603 Douglas.Cain@dot.wi.us	Joint Lead Agency
Wisconsin Department of Natural Resources (DNR)	Kristina Betzold 2300 N. Dr. Martin Luther King Jr. Dr. Milwaukee, WI 53212 (414) 263-8517 Kristina.Betzold@wisconsin.gov	Cooperating Agency (accepted 7/21/10)
Wisconsin Department of Natural Resources (DNR)	Michael Thompson 2300 N. Dr. Martin Luther King Jr. Dr. Milwaukee, WI 53212 (414) 303-3408 MichaelC.Thompson@wisconsin.gov	Cooperating Agency (accepted 7/21/10)
State Historic Preservation Office (SHPO)	Michael Stevens 816 State Street Madison, WI 53706 (608) 264-6515 Michael.Stevens@wisconsinhistory.org	Participating Agency (declined 6/14/10)
Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP)	Peter Nauth 2811 Agricultural Drive PO Box 8911 Madison, WI 53708-8911 (608) 224-4650 Peter.Nauth@datcp.state.wi.us	Participating Agency (no response)
Native American Tribes		
Bad River Band of Lake Superior Chippewa Indians of Wisconsin	Mike Wiggins, Jr., Chair PO Box 39 Odanah, WI 54861	Participating Agency (no response)
Forest County Potawatomi Community of Wisconsin	Harold "Gus" Frank Chair PO Box 340 Crandon, WI 54520	Participating Agency (no response)
Ho-Chunk Nation	Jon Greendeer President PO Box 667 Black River Falls, WI 54615	Participating Agency (no response)
Lac Vieux Desert Band of Lake Superior Chippewa Indians	Allan Shively Tribal Chairman PO Box 249 Watersmeet, WI 49969	Participating Agency (no response)

Agency Name	Contact Person Name/Address/Phone Number	Project Role
Menominee Nation	Randal Chevalier Chairperson PO Box 910 Keshena, WI 54135	Participating Agency (no response)
Prairie Band Potawatomi Nation	Steve Ortiz Chairman 16281 Q Road Mayetta, KS 66509	Participating Agency (no response)
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	Rose Soulier Chairwoman 88385 Pike Road Bayfield, WI 54814	Participating Agency (no response)
Sac & Fox Nation of Mississippi in Iowa	Frank Blackcloud Chairman 349 Meskwaki Road Tama, IA 52339-9626	Participating Agency (no response)
Sac & Fox Nation of Missouri in Kansas and Nebraska	Michael Dougherty Chairperson 305 North Main Reserve, KS 66434	Participating Agency (no response)
Sac & Fox Nation of Oklahoma	George Thurman Principal Chief Route 2, Box 246 Stroud, OK 74079	Participating Agency (no response)
Sokaogon Chippewa Community Mole Lake Band	Garland McGeshick Tribal Chair 3051 Sand Lake Road Crandon, WI 54520	Participating Agency (no response)
Great Lakes Intertribal Council	Michael Allen Executive Director PO Box 9 Lac du Flambeau, WI 54538 glitc@glitc.org	Participating Agency (no response)
Local Agencies/Other Interests		
Waukesha County	Gary Evans 1320 Pewaukee Road Waukesha, WI 53188 (262) 548-7740 gevans@waukeshacounty.gov	Joint Lead Agency
Southeast Wisconsin Regional Planning Commission (SEWRPC)	Ken Yunker W239 N1812 Rockwood Drive Waukesha, WI 53187-1607 (262) 547-6722 kyunker@sewrpc.org	Participating Agency (accepted 7/25/10)
City of Waukesha	Fred Abadi 130 Delafield Street Waukesha, WI 53188 (262) 543-3596 fabadi@ci.waukesha.wi.us	Participating Agency (no response on participating agency request, but participates in monthly study team meetings)

Agency Name	Contact Person Name/Address/Phone Number	Project Role
City of Pewaukee	Scott Klein W240 N3065 Pewaukee Road Pewaukee, WI 53072 (262) 691-0770 mayor@pewaukee.wi.us	Participating Agency (accepted 5/27/10)
Town of Waukesha	Angie Van Scyoc W250S3567 Center Road Waukesha, Wisconsin 53189-7364 (262) 542-5030	Participating Agency (no response on participating agency request, but participates in monthly study team meetings)

Section 3: Concurrence and Coordination Points and Agency Responsibilities

3.1 Agency Expectations

The expectations for Lead Agencies are:

- Manage and coordinate the environmental review process, insuring that environmental information is available to public officials and citizens before decisions are made and before actions are taken.
- Prepare the environmental document in accordance with 23 CFR part 771 (FHWA Environmental Impact and Related Procedures) and 40 CFR parts 1500-1508 (Council on Environmental Quality Regulations for Implementing NEPA).
- Provide, as early as practicable but no later than the appropriate project milestone, accurate and complete project information on purpose and need, environmental resources, alternatives, and proposed impact analysis methodologies.
- Identify and involve Cooperating and Participating Agencies.
- Develop the Coordination Plan.
- Provide opportunity for public and agency involvement in defining the purpose and need, alternatives carried forward for detailed study, and selection of preferred alternative.
- Collaborate with Cooperating and Participating Agencies in determining Impact Analysis Methodologies and the level of detail for the analysis of alternatives.
- Consult with and involve Tribal governments in compliance with NEPA and Section 106 of the National Historic Preservation Act.
- Manage and facilitate the process of resolving issues.

The expectations for Cooperating Agencies are:

- Assist the Lead Agencies in identifying environmental or cultural resources of concern.
- Identify as early as practicable any issue or concern regarding the project's environmental, cultural or socioeconomic impacts.
- Identify as early as practicable any issues that could substantially delay or prevent the granting of permits or other approvals needed for the project.
- Share information that may be useful to the Joint Lead Agencies, Cooperating and Participating Agencies.
- Participate in meetings and field reviews.
- Provide timely concurrence at milestones for purpose and need, alternatives carried forward for detailed study, and selection of preferred alternative.
- Provide timely comments on the Coordination Plan, Impact Analysis Methodologies, and potential project impacts as agreed to and reflected in Section 4 of this Plan.
- Review and comment on preliminary Draft and Final EIS.
- Participate as needed in issues resolution activities.

The expectations for Participating Agencies are:

- Assist the Lead Agencies in identifying environmental or cultural resources of concern.
- Identify as early as practicable any issue or concern regarding the project's environmental, cultural or socioeconomic impacts.
- Share information that may be useful to the Joint Lead Agencies, Cooperating and Participating Agencies.
- Participate in meetings and field reviews as appropriate and invited.
- Provide comments on purpose and need, Coordination Plan, Impact Analysis Methodologies, project alternatives and potential impacts in a timely manner, and as agreed to and reflected in Section 4 of this Plan.
- Review and comment on the Draft EIS and Final EIS.
- Participate as needed in issues resolution activities.

3.2 Concurrence and Coordination Points, Information Requirements, and Responsibilities

To facilitate public and agency involvement in the environmental review process for the West Waukesha Bypass Study, several coordination and concurrence points have been established. Coordination points ("check-in" points for a set of activities) occur when project review activities or milestones will eventually result in important decisions affecting the environmental review process and its outcome. Concurrence points are steps in the environmental review process for which the Lead Agencies will request formal written agreement from Cooperating Agencies, and in some cases Participating Agencies, on finalizing certain decisions or outputs, and moving forward.

Coordination points will involve exchanges of information and opinions between the Lead Agencies, Participating and Cooperating Agencies, and the public. This information exchange will often be accomplished by mail or email, but may also occur through agency or public information meetings. Coordination points with agencies are typically established for the following activities:

- Project scoping activities
- Development of purpose and need statement
- Identification of the range of alternatives to be studied
- Collaboration on Impact Analysis Methodologies
- Completion of the Draft EIS
- Identification of the preferred alternative and the level of design detail
- Mitigation measures
- Completion of the Final EIS
- Completion of the record of decision (ROD) finalizing selection of the preferred alternative

Concurrence is a written agreement by a Cooperating or Participating Agency that the information to date is adequate to agree that the project can be advanced to the next stage of project development. Agencies agree not to revisit the previous process steps unless conditions change. Concurrence by an agency at a concurrence point does not imply that the project has been approved by that agency or that it has released its obligation to determine whether the fully developed project meets statutory review criteria. There are three formal concurrence points in the process:

- Final Purpose and Need statement for the project
- Alternatives to be carried forward for detailed study
- Selection of the preferred alternative for addressing project purpose and need

The Project Schedule in Section 4 lists the Coordination Plan's key concurrence and coordination points including which agency is responsible for activities during specific points, the information required at each point, and who is responsible for transmitting the information.

3.3 Issue Resolution Process

The Lead Agencies, Cooperating and Participating Agencies will work cooperatively to identify and resolve issues that could delay completion of the environmental review process or that could result in denial of any approvals required for the project under applicable laws. See Appendix A, the last page of this document.

Based on information received from the Lead Agencies, Cooperating and Participating Agencies shall identify as early as practicable, any issues of concern regarding the project's potential environmental, cultural or socioeconomic impacts. Issues of concern include any issues that could substantially delay or prevent concurrence, the granting of permits or other approvals needed to implement the project.

Dispute resolution will be implemented when there is failure to reach concurrence at a concurrence point or there is substantial disagreement at a critical decision point. The resolution process will first consist of an informal attempt to reach concurrence/agreement among Cooperating/Participating Agencies. Participants would include a representative of each of the Federal agencies and appropriate State agencies. Each agency shall make its best effort to resolve disputes. Within 30 days of an agency identifying non-concurrence at a critical decision point, a "dispute resolution" meeting of designated agency representatives would be convened.

Dispute resolution meetings will be convened at an agreed upon location and time. At this meeting an attempt will be made to resolve agency concerns through consensus. This may include providing information or detail not previously provided. If the concerns are resolved at this meeting, the process is ended and the concurrence is formalized in the agreed upon manner.

If a resolution cannot be achieved within 30 days following the dispute resolution meeting, and the Lead Agencies determine that all information necessary to resolve the issue has been obtained and distributed, the Lead Agencies shall notify the heads of all participating parties, the project sponsor, the Governor, the U.S. Senate Committee on Environment and Public Works, the U.S. House of Representatives Committee on Transportation and Infrastructure, and the Council on Environmental Quality. Such notification shall also be published in the Federal Register.

The environmental review and documentation process may continue whether or not attempts to reach concurrence are successful. However, if the dispute remains unresolved, the agency in non-concurrence retains its options to elevate its concerns through existing, formalized dispute elevation procedures at the appropriate point in the environmental review or permitting process.

Section 4: Project Schedule

4.1 Project Schedule and Negotiated Timeframes

The major milestones, coordination and concurrence points in the project's environmental review process are listed in Table 4.1 along with the timeframes in which they are anticipated to occur (actual dates listed where applicable). The listed timeframes must be discussed and negotiated with Cooperating and Participating Agencies, and should not appear in this table as "final" until affected agencies agree they are appropriate and achievable. By agreeing to the timeframes listed below, agencies accept their responsibility to provide appropriate input and feedback within the allotted time.

Table 4.1

Step No.	Milestone, Coordination or Concurrence Point	Information Provided or Action Taken	Who Contacted for Response	Information or Action Requested	Number of Days to Complete Activity	Estimated Date of Completion
1	Notice of Intent (NOI) to prepare EIS and proposed project scope	NOI to prepare EIS and proposed project scope	Cooperating and Participating agencies through Federal Register notice	NOI to prepare EIS and proposed project scope published in Federal Register	7 calendar days	5/11/2010 (actual)
2	Invitation letters, draft Coordination Plan (CP) and draft Impact Analysis Methodology (IAM) sent to potential cooperating and participating agencies	Letters of invitation to be cooperating or participating agencies Draft CP and IAM	Potentially interested cooperating and participating agencies	Written acceptance or reason for non-acceptance Agency input on draft CP and IAM	30 calendar days	Invitations Sent 5/25/10-6/15/10 (actual) Responses due (7/15/10)
3	Initial Agency Scoping Meeting	Discussion of draft CP and IAM; preliminary purpose and need; initial range of alternatives	Cooperating and Participating agencies	Provide comments on draft CP and IAM, preliminary purpose and need, initial range of alternatives	30 calendar days	Scoping Meeting 7/20/10 (actual)
4	First Public Info. Meeting (PIM) Public input on draft CP and IAM, purpose and need, and initial range of alternatives	Availability of draft CP and IAM, purpose and need, and initial range of alternatives through media releases, project website and public meeting	Cooperating and participating agencies, tribes, public, local officials and other stakeholders	Provide comments on draft CP and IAM, purpose and need, and range of alternatives	30 calendar days	5/18/10 (actual)
5	Draft Purpose and Need statement	Draft purpose and need statement for review	Cooperating and participating agencies	Provide comments on purpose and need (Draft EIS Section 1)	30 calendar days	EIS Section 1 sent to agencies 10/29/10 (actual) Responses due 11/29/10
6	Final coordination and impact analysis methodology plans with follow up as needed	Final coordination and impact analysis methodology plans	Cooperating and participating agencies	Review for acceptance or reply on issues to be resolved	30 calendar days	10/29/10

Step No.	Milestone, Coordination or Concurrence Point	Information Provided or Action Taken	Who Contacted for Response	Information or Action Requested	Number of Days to Complete Activity	Estimated Date of Completion
7	Concurrence Point #1 Agency meeting on purpose and need	Discuss purpose and need statement	Cooperating and participating agencies	Review for acceptance or reply on issues to be resolved	30 calendar days (Preliminary information sent 30 days prior to meeting)	No meeting held Draft EIS Section 1 sent to agencies 10/29/10 (actual) Responses due 11/29/10
8	Provide range of alternatives to be considered	Range of alternatives to be considered; identify alternatives that will be retained for detailed study	Cooperating and participating agencies	Provide comments on range of alternatives and those retained for detailed study (Draft EIS Sec. 2)	30 calendar days	Draft EIS Section 2 sent to agencies 5/25/11 (actual) Responses due 6/25/11
9	Concurrence Point #2 Review range of alternatives considered	Discuss range of alternatives considered and alternatives that will be retained for detailed evaluation in Draft EIS	Cooperating and participating agencies	Provide comments on alternatives and WisDOT recommended alternative if one is identified at this time	30 calendar days (Preliminary information sent 30 days prior to meeting)	Agency meeting on alternatives 7/25/11 (actual) Updated Draft EIS Section 2 sent to agencies 3/2012 Responses due 4/2012
10	Second Public Info. Meeting (PIM)	Availability of purpose and need and range of alternatives	Public, local officials and other stakeholders	Provide comments on purpose and need and range of alternatives	30 calendar days	Second PIM 7/14/10 & 8/4/10 (actual) A third PIM was also held on 2/10/11
11	Draft EIS filed with EPA; availability notice published in Federal Register	Draft EIS	EPA filing section	Availability of Draft EIS published in Federal Register	14 calendar days	6/2012
12	Draft EIS circulated for review and comment	Draft EIS availability through distribution to cooperating and participating agencies, local officials and others on EIS mailing list, and through media announcements, project website and other sources	Cooperating and participating agencies, local officials, other stakeholders, and public	Review Draft EIS, provide comments	45 calendar days after information is sent	6/2012
13	Public hearing on Draft EIS with follow up as needed	Discuss purpose and need, alternatives, recommended alternative (if identified) and anticipated impacts	Public, local officials, cooperating and participating agencies	Provide comments on purpose and need, alternatives, recommended alternative (if identified) and anticipated impacts	45 calendar days	8/2012

Step No.	Milestone, Coordination or Concurrence Point	Information Provided or Action Taken	Who Contacted for Response	Information or Action Requested	Number of Days to Complete Activity	Estimated Date of Completion
14	Concurrence Point #3 Agency meeting on preferred alternative with anticipated impacts and follow up as needed	Discuss preferred alternative, anticipated impacts, proposed mitigation measures	Cooperating and participating agencies	Provide comments on preferred alternative, anticipated impacts, proposed mitigation measures	30 calendar days (Preliminary information sent 30 days prior to meeting.)	11/2012
15	Final EIS filed with EPA; availability notice published in Federal Register	Final EIS	EPA filing section	Availability of Final EIS published in Federal Register	14 calendar days	12/2012
16	Final EIS circulated for review and comment	Final EIS availability through distribution to cooperating and participating agencies, local officials and others on EIS mailing list, and through media announcements, project website and other sources	Public, local officials, cooperating and participating agencies	Review Final EIS, provide comments	30 calendar days from notice of Final EIS in Federal Register (minimum)	12/2012
17	Record of Decision (ROD) issued	ROD availability through distribution to cooperating and participating agencies, and through local media announcements, project website and/or other sources	Cooperating and participating agencies and as deemed appropriate, local officials and the public	Acknowledge receipt of ROD	30 calendar days from notice of Final EIS in Federal Register or 45 calendar days from notice of Draft EIS in Federal Register (minimum)	3/2013
18	Statute of Limitations (SOL) notice published in Federal Register announcing final action has been taken (ROD) in NEPA phase	SOL notice	Federal Register	SOL published in Federal Register announcing final action taken (ROD) in NEPA phase	7 calendar days for SOL notice publication; 180 calendar days to file a claim	9/2013
19	Final concurrence in project contract-level mitigation measures	Proposed mitigation measures for commitments made in Final EIS, ROD, final design, and/or during individual agency contacts	Coordination with cooperating and participating agencies as deemed appropriate	Provide comments and/or process approval requests on proposed environmental commitments and mitigation measures	Approx. 3-6 months in advance of proposed contract letting dates)	Prior to Plans, Specifications and Estimates (PS&E)
21	Implementation of mitigation commitments in Final EIS and ROD	Mitigation commitments in Final EIS and ROD	Coordinate with cooperating and participating agencies as deemed appropriate	Provide comments and recommendations, and/or process approval requests on proposed mitigation commitments	Un-programmed (time as needed)	Ongoing until construction activities are completed

Section 5: Public Involvement Process

5.1 Public Involvement

Public involvement includes engaging key stakeholders, community members and the general public in the planning, design and development of proposed improvements. The general public involvement approach is based on the following objectives:

- Actively seek public input on the project's purpose and need, alternatives, and recommended course of action.
- Solicit, consider, answer and document public inquiries, suggestions, ideas, and concerns in the decision making process.
- Provide opportunities for the public to affect major decisions before those decisions are made
- Publicize project activities through a variety of communication venues such as newsletters, news releases, project website and informational meetings.
- Provide the public with efficient access to project information.

5.2 Identification of Environmental Justice Communities and Outreach

To determine if Environmental Justice Communities are present in the study corridor, local demographic data for the City and Town of Waukesha and Waukesha County will be obtained from the U.S. Census (2000) and the Waukesha County Comprehensive Plan. The data will include information on population, ethnicity, and income. If 2010 U.S. Census data becomes available before the Draft EIS is approved it will be included in the EIS. The presence of minority and/or low-income populations will also be monitored through the study's public involvement program.

The study's public involvement process is designed to disseminate information on the project and to obtain public input. The process will include outreach to Environmental Justice Communities to ensure their participation in the decision making process.

5.3 Public Involvement in Purpose and Need Development

The public had opportunity to participate in purpose and need development through the advisory committee meeting on May 6, the first public information meeting on May 18 and other neighborhood and outreach meetings during preparation of the Draft EIS. The public will also have an opportunity to comment on purpose and need at the public hearing and during the review period for the Draft EIS.

5.4 Public Involvement in Alternatives Identification and Analysis

The public will have opportunities to participate in identifying the initial range of alternatives, the extent of alternatives analysis, the reasonable alternatives selected for detailed study and selection of a preferred alternative. Forums for participation include public information meetings, neighborhood and other outreach meetings during preparation of the Draft EIS. The second public information meeting will specifically solicit input on alternatives. There will also be opportunities to provide input on the alternatives at the public hearing, and during availability of the Draft and Final EIS for public review.

5.5 Public Involvement in Document Reviews

The Draft and Final EIS will be made available for public review. The Coordination Plan and Impact Analysis Methodology will also be made available at public information meetings.

5.6 Additional Public Involvement Strategies

The study team will prepare a Public Involvement Plan that will be a comprehensive "blueprint" of public involvement activities carried out during the course of the project. The plan will be updated as needed if changes to the proposed process are made. Additionally, a project mailing list will be developed that includes local government officials, elected officials, key stakeholders, agency representatives, property owners in and adjacent to the study corridor, meeting attendees, those who request information, and other study team contacts.

Project newsletters will be distributed to provide project information/updates and to announce public information meetings and other study milestones. News releases will be provided to local media outlets to announce the public information meetings and availability of the EIS for public review.

Three public information meetings are proposed. The first meeting focused on describing the study process, presenting the results of data gathering for the study area, information on transportation deficiencies and other factors relevant to project purpose and need. The draft agency coordination plan and impact assessment methodologies were available for review at this meeting. The draft Coordination Plan and Impact Analysis Methodology will be available for public review.

The second public information meeting will present information on the initial range of alternatives being considered.

The third public information meeting will be to present the refined alternatives and obtain input on the reasonable range of alternatives that will be carried forward for detailed evaluation.

A public hearing will be held during the Draft EIS comment period.

Study team members will meet with interest groups, neighborhood organizations, or individual property owners upon request to resolve as many concerns as possible. The project website will contain information such as contacts, newsletters, reports, study schedule, upcoming meeting information, exhibits from public information meetings and other information.

A community sensitive solutions (CSS) advisory committee representing a broad range of stakeholders was established to assist the study team in identifying key issues that should be considered in development of project purpose and need, alternatives, impact analyses and other aspects of the West Waukesha Bypass Study. The CSS advisory committee includes representatives such as local officials, state and federal review agencies, Southeastern Wisconsin Regional Planning Commission, neighborhoods, community leaders, environmental groups and other interests. The group met in March and May 2010 and three more meetings are planned.

5.7 Coordination with Local Officials

Coordination with local officials will include their participation in the Advisory Group and through individual meetings as needed during the course of the study.

5.8 Availability of Coordination Plan for Agency and Public Involvement

The Coordination Plan along with the Impact Analysis Methodology will be sent to Cooperating and Participating Agencies. The Plans will be reviewed at the agency scoping meeting and made available to the public at the public information meetings and public hearing. The Plans are also available for public review on Waukesha County's West Waukesha Bypass Study website and upon request at the WisDOT SE Region office and the Waukesha County Department of Public Works office.

Section 6: Tribal Involvement and Consultation

6.1 Tribal Notifications of Proposed Project

As part of the EIS activities, Tribes will be notified about the project purpose and need, alternatives being considered, initial Area of Potential Effect (APE), planned cultural resource investigations, and will be asked to provide input on cultural resource aspects. The Tribes will also be provided an opportunity to become Participating Agencies in the study and will be notified about public information meetings and the public hearing.

6.2 Tribal Consultation on Project Area of Potential Effect (APE)

Tribal consultation regarding the project APE will be done as part of item 6.1.

6.3 Tribal Consultation on Cultural Resources Identified

Interested Tribes will be notified about the results of the cultural resources investigation. The need for further consultation under Section 106 of the National Historic Preservation Act will depend on whether any significant cultural resources are found in the project's APE.

6.4 Tribal Consultation on Effects

The need for Tribal consultation under Section 106 of the National Historic Preservation Act will depend on whether any significant cultural resources are found in the project's APE.

Section 7: Summary of all Project Meetings to Date

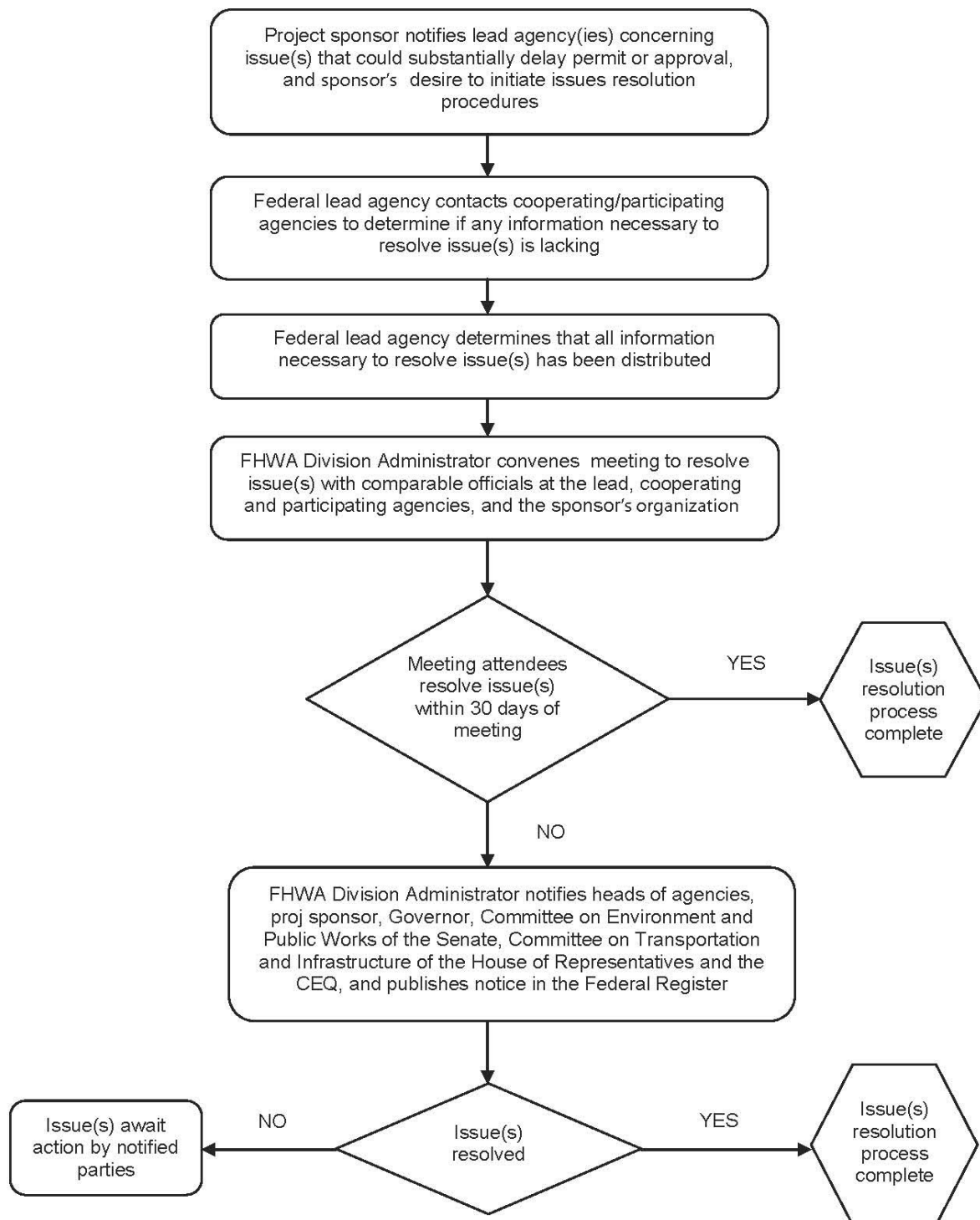
7.1 List of Project Meetings with Agencies or the Public

Date	Meeting	Remarks
Community Sensitive Solutions (CSS) Advisory Committee		
3/24/10	First CSS workshop	Introduce the West Waukesha Bypass study, explain the CSS process, and identify factors that should be addressed in the study.
5/6/10	Second CSS workshop	Further review and ranking of factors to be addressed in the study.
6/22/10	Third CSS workshop	Focused on identifying positive and negative aspects of the preliminary range of alternatives.
9/15/10	Fourth CSS workshop	Review criteria for screening preliminary alternatives, obtain input on alternatives that should be eliminated or retained for further study.
1/30/11	Fifth CSS workshop	Update committee on traffic and impact aspects of the alternatives under consideration, evaluation of alternatives through rating exercise.
Public Information Meetings		
5/18/2010	First public information meeting	Introduce the West Waukesha Bypass study, describe study purpose and goals, provide background on existing transportation deficiencies and environmental resources, obtain public views on the need for and possible locations for a future bypass.
7/14/2010 and 8/4/2010	Second public information meeting (second session held on 8/4 due to some concern about timeliness of the notice for the 7/14 meeting)	Obtain public input on the initial range of alternatives. Copies of Draft CP and IAM also available for public review and comment.
2/10/11	Third public information meeting	Obtain public input on latest range of alternatives. Copies of the Draft CP and IAM also available for public review and comment.
Local Officials		
3/4/10	City of Waukesha Board of Public Works	Briefing on study process and schedule.
3/11/10	Waukesha County Board Public Works Committee	Briefing on study process and schedule.
4/16/10	Waukesha Chamber of Commerce Southside Business Council	Briefing on study process and schedule.
6/15/10	Waukesha School District	Study overview, review of preliminary alternatives and possible effects on school district property on west side of Merrill Hills Road.
7/13/10	Local elected officials	Briefing on study process and schedule.
7/20/10	Agency scoping meeting	Obtain input from cooperating and participating agencies on significant issues to be addressed in the EIS, purpose and need factors, and preliminary range of alternatives.

Date	Meeting	Remarks
9/23/10	Town of Waukesha	Briefing on study process and schedule.
10/14/10	Waukesha County Board Public Works Committee	Study update, information on alternatives being considered for elimination or further evaluation.
10/19/10	Waukesha City Council	Study update, information on alternatives being considered for elimination or further evaluation.
1/27/11	Town of Waukesha Board and Plan Commission	Study update, information on alternatives being considered for elimination or further evaluation.
3/10/11	Waukesha County Board Transportation Committee	Study update, information on alternatives being considered for elimination or further evaluation, summary of input from 2/10/10 public information meeting.
3/30/11	Town of Waukesha, three Town Board Supervisors	Obtain input on potential indirect and cumulative effects.
4/29/11	Newly elected City of Waukesha alderman (Reiland)	Briefing on study process and schedule.
6/6/11	City of Waukesha Parks, Recreation and Forestry Board Meeting	Study overview, alternatives, potential land acquisition from former Pewaukee fire station parcel, Kisdon Hill Park, and Pebble Creek Park.
9/12/11	City of Waukesha Parks, Recreation and Forestry Board Meeting	Obtain input on study team's request to pursue a de minimus Section 4(f) finding for potential parkland impacts; motion made to concur in de minimus finding.
9/26/11	City of Waukesha alderman (Ybarra)	Discuss bicycle and pedestrian safety near north end of project (possible measures to enhance safety for bicycle/pedestrian crossings of Meadowbrook Road).
State and Federal Review Agencies		
3/25/10	DNR and WisDOT SE Region wetland ecologist	Briefing on study process and schedule; discussed DNR concerns about an alignment through the Pebble Creek corridor.
7/20/10	Agency scoping meeting	Obtain input from cooperating and participating agencies on significant issues to be addressed in the EIS, purpose and need factors, and preliminary range of alternatives.
7/25/11	Inter-agency meeting	Study update, review information on natural resources in the Pebble Creek corridor; obtain input on alternatives and discuss agency concerns.
9/26/11	Inter-agency field review of environmental resources in project corridor	Review of alternatives being considered, review of wetland delineations and groundwater information, field review of wetlands and other resources in the Pebble Creek and Sunset to County X corridors.
Miscellaneous Community Outreach		
8/23/10	Kisdon Hill neighborhood meeting	Briefing on study process and schedule, obtain citizen input on issues and concerns that should be addressed in the development and evaluation of alternatives.
11/8/10	Meeting with two home/business owners on Merrill Hills Road	Summary of current alternatives including an alternative along Merrill Hills Road; obtain input on issues and concerns.
11/11/10	Merrill Hills Country Club and residents of Merrill Hills neighborhood	Briefing on study and current range of alternatives being considered; obtain input on issues and concerns.
11/16/10	Waukesha County Business Alliance	Briefing on study and current range of alternatives being considered; obtain input on issues and concerns.

Date	Meeting	Remarks
11/17/10	Meadowbrook School	Briefing on study and current range of alternatives being considered including traffic signal options near Meadowbrook School; obtain input on issues and concerns.
3/3/11	Kisdon Hill Court interest group (Waukesha County and City of Waukesha representatives, and Kisdon Hill Court resident)	Review options for reconstruction of the Kisdon Hill Court connection to County TT; obtain input on issues and concerns.
3/9/11	Property owners (County TT/Sunset Drive and County TT across from Kame Terrace)	Review of alternatives and potential impacts on properties in the County TT/Sunset Drive and Kame Terrace areas), obtain input on issues and concerns.
4/9/11	Meadowbrook School parents and residents near school	Review of alternatives and potential impacts in the vicinity of Meadowbrook School; obtain input on issues and concerns.
6/13/11	Harrogate Drive Condo owners (Condos located in northeast corner of County TT/Madison Street intersection)	Study overview, review of current range of alternatives being considered in the Harrogate Drive area; obtain input on issues and concerns.
8/22/11	Waukesha Rotary Club	Study overview and review of current range of alternatives being considered; obtain input on issues and concerns.
10/18/11	Merrill Hills Country Club	Discuss potential impacts to country club if the Golf Course East alternative would be shifted onto the country club property to avoid homes on the west side of Merrill Hills Road.

FORMAL DISPUTE RESOLUTION PROCESS



SAFETEA-LU 6002

IMPACT ANALYSIS METHODOLOGY

West Waukesha Bypass
I-94 to STH 59
Waukesha County, WI
WisDOT Project I.D. 2788-01-00



U.S. Department of Transportation
Federal Highway Administration



Wisconsin Department of Transportation



Waukesha County Department of Public Works

Previous Version May 2010
(Update #1 February 2012)

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Revision History

This Impact Analysis Methodology (IAM) is intended to be a dynamic document that will be available to stakeholders and updated as appropriate throughout the duration of the project. Below is a record of substantive changes made to this document.

The Lead Agencies will make the IAM available to other agencies and the public who have expressed an interest in the project. The IAM will be revised when there have been substantive changes in the activities or actions described in the plan. Revisions and changes to the IAM will be communicated to agencies in a timely manner and shared with the public through availability at public information meetings and posting on Waukesha County's West Waukesha Bypass website.

Coordination Plan Version	Date of Change	Revision Description
Original Version May 2010	February 2012	Section 12.3—Updated entry on additional wetland review/delineation conducted by SEWRPC. Section 14.3—Updated entry on additional groundwater investigations conducted by the project team. Section 16.3 —Updated entry on additional investigations conducted by Great Lakes Ecological Services LLC for potential impacts on state-listed threatened species habitat (Butler's gartersnake and Blanding's turtle).

Section 1: Introduction

1.1 Purpose of Impact Analysis Methodology

Section 6002 of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) requires lead agencies for proposed federally funded transportation projects to determine the appropriate methodology and level of detail for analyzing impacts in collaboration with cooperating and participating agencies. Consensus on the methodology¹ is not required, but the lead agency must consider the views of the cooperating and participating agencies with relevant interests before making a decision on a particular methodology. Well-documented, widely accepted methodologies, such as those for noise impact assessment and evaluation of impacts under Section 106 of the National Historic Preservation Act would require minimal collaboration. If a cooperating or participating agency criticizes the proposed methodology for a particular environmental factor, the agency should describe its preferred methodology and why it is recommended.

The purpose of the impact analysis methodology is to communicate and document the lead agency's structured approach to analyzing impacts of the proposed transportation project and its alternatives. Collaboration on the impact analysis methodology is intended to promote an efficient and streamlined process and early resolution of concerns or issues.

The methodology discussion for each resource known or believed to be located in the project study area is broken into three parts. The first subsection identifies the laws, regulations and guidelines applicable to the particular resource. The second subsection discusses the purpose of evaluating potential resource impacts and general methodologies commonly used on proposed WisDOT transportation projects to define, identify, and determine potential impact(s) to the resource. The third subsection discusses any project-specific methodologies used to further refine the work completed as part of the second subsection.

1.2 Project Background

Waukesha County, in cooperation with the Federal Highway Administration (FHWA) and the Wisconsin Department of Transportation (WisDOT), will prepare an Environmental Impact Statement (EIS) for transportation improvements between IH-94 and WIS 59 on the west side of the City of Waukesha. The transportation improvements are being proposed to address growing local and regional traffic volumes, and to enhance traffic flow and safety. The objective is to provide a north-south link between IH-94 and WIS 59 that will complete the existing partial circumferential "beltline" around the City of Waukesha.

Several regional land use and transportation system plans prepared by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) have included a West Waukesha Bypass. Most recently, the 2035 Regional Transportation System Plan for Southeastern Wisconsin (Planning Report 49, June 2006) includes a bypass corridor between I-94 and WIS 59 that would use a combination of Meadowbrook Road/Merrill Hills Road to a point north of Sunset Drive where it would then be on new alignment to the WIS 59 intersection with County X.

The regional planning process considers the potential of more efficient land use and expanded public transit, systems management, bicycle and pedestrian facilities, and demand management to first alleviate

¹ The congressional Conference Report accompanying SAFETEA-LU states: "Collaboration means a cooperative and interactive process. It is not necessary for the lead agency to reach consensus with the participating agencies on these issues; the lead agency must work cooperatively with the participating agencies and consider their views, but the lead agency remains responsible for decision making." FHWA's NEPA regulations (23 CFR 771) require that those federal agencies with jurisdiction by law (permitting or land transfer authority) be invited to be Cooperating Agencies for an EIS. SAFETEA-LU created a new Participating Agency category for the EIS process. Participating Agencies are federal and non-federal governmental agencies that may have an interest in the project because of their jurisdictional authority, special expertise and/or statewide interest.

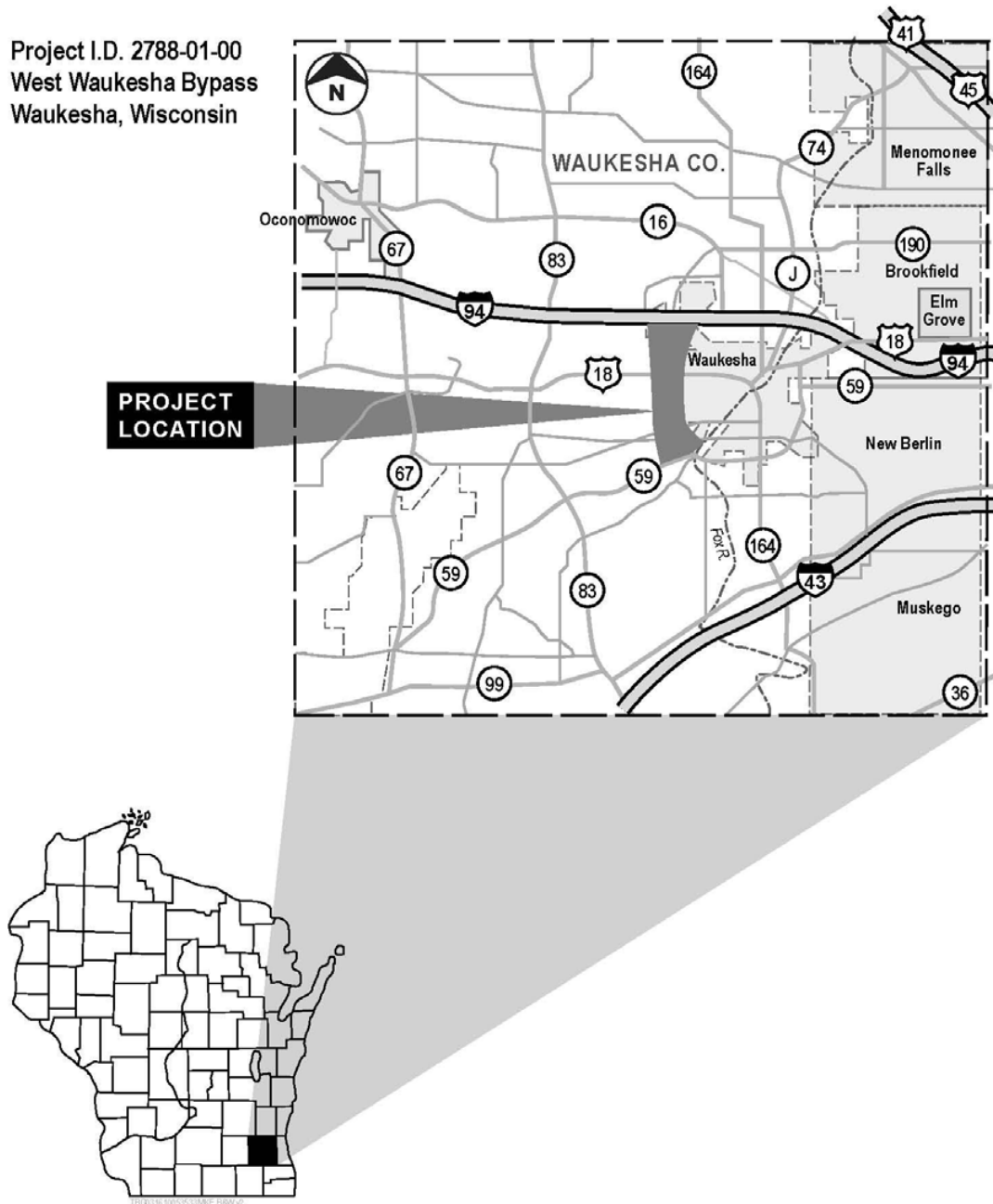
² The methodology used by the lead agency must be consistent with any methodology established by statute or regulation under the authority of another federal agency.

traffic congestion (a transportation system management plan). Highway improvements, such as the recommended West Waukesha Bypass, were only then considered to address any residual congestion. As a result the EIS for this study will incorporate, by reference, the modal evaluation of the regional planning process.

Waukesha County plans and the official map for the City of Waukesha also include this same bypass alignment. Waukesha County's official map shows this alignment as a result of a study in 1990-1991 that assessed the need for the West Waukesha Bypass and reviewed several different alignments before ultimately selecting the Meadowbrook Road/Merrill Hills Road alignment.

1.3 Project Vicinity Map

Project Location



Section 2: General Economics Impact Methodology

2.1 Laws, Regulations and Guidelines

General economic impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT's Facilities Development Manual Chapter 25, *Socioeconomic Factors*

2.2 General Methodology

Evaluation of economic impacts includes cost estimates of the proposed action and its alternatives; applicable effects on economic development trends and viability; effects on employment opportunities; effects on highway-dependent businesses; and effects on existing and planned business development. Economic impacts that can be quantified based on available data will be presented as such in the EIS and other impacts will be discussed qualitatively.

2.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study. Data for the general economics impact assessment will be obtained **primarily from the 2010 US Census and the Waukesha County Comprehensive Plan**. Supplemental data will be obtained from the Southeast Wisconsin Regional Planning Commission (SEWRPC), local and regional land use plans, comprehensive plans, development plans, and discussion with local officials.

Section 3: Business Impact Methodology

3.1 Laws, Regulations and Guidelines

Business impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- *The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as amended (49 CFR Part 24)*
- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987

3.2 General Methodology

Evaluation of business impacts includes an estimate of the number and types of businesses to be displaced, number of employees/jobs affected any special characteristics, and availability of replacement business sites. Depending on the number and types of businesses displaced, a Conceptual Stage Relocation Plan may be prepared as part of the EIS. Impacts to businesses as a result of changes in access during and after construction will also be evaluated.

3.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 4: Community and Residential Impact Methodology

4.1 Laws, Regulations and Guidelines

Community and residential impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- *The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as amended (49 CFR Part 24)*
- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT's Facilities Development Manual Chapter 25, *Socioeconomic Factors*

4.2 General Methodology

Evaluation of residential impacts includes an estimate of the number of homes to be displaced, including family characteristics; availability of comparable decent, safe, and sanitary housing in the area; any measures to be taken when replacement housing is insufficient; and identification of any special relocation needs. Depending on the number and types of homes displaced, a Conceptual Stage Relocation Plan may be prepared as part of the EIS. Impacts to homes as a result of changes in access during and after construction are also evaluated.

Evaluation of community impacts includes applicable changes in neighborhoods or community cohesion; changes in travel patterns and accessibility; impacts on community facilities; impacts on traffic safety/public safety; and impacts on any special groups such as elderly, handicapped, minority, and transit-dependent persons. Socioeconomic impacts that can be quantified based on available data will be presented as such in the EIS and other impacts will be discussed qualitatively.

4.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 5: Indirect and Cumulative Effects Methodology

5.1 Laws, Regulations and Guidelines

Indirect and cumulative effects are evaluated in accordance with these key laws, regulations or guidelines:

- Council on Environmental Quality (CEQ) publication, *Considering Cumulative Effects under the National Environmental Policy Act*, 1997
- FHWA position paper, *Secondary and Cumulative Impact Assessment in the Highway Development Process*, 1992
- National Cooperative Research Program (NCHRP) Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, 2002
- WisDOT *Guidance for Conducting an Indirect Effects Analysis*, November 2007
- WisDOT *Guidance for Conducting a Cumulative Effects Analysis*, November 2007
- 40 CFR, Chapter 1, Section 230.11(g)(h); Protection of Environment, Environmental Protection Agency, *Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material*
- 33 CFR, Part 230, Section 320.4(a)(1); Navigation and Navigable Waters, General Regulatory Policies, *General Policies for Evaluating Permit Applications*.

Indirect and cumulative effects are defined as follows:

Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8, Council on Environmental Quality regulations for implementing the National Environmental Policy Act).

Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7, Council on Environmental Quality regulations for implementing the National Environmental Policy Act).

5.2 General Methodology

The indirect effects analysis methodology includes the following key components:

- Scoping—Select tools/activities and determine the study area
- Inventory the study area and notable features such as land use/development trends, demographics and natural resources including aquatic ecosystems
- Identify impact causing activities of the proposed project alternatives
- Identify the potentially significant indirect effects
- Analyze indirect effects, describe their significance for the project alternatives and evaluate assumptions
- Assess consequences and identify mitigation measures
- The analysis is supported by input/information from local officials, agencies, and community outreach activities.

The cumulative effects analysis methodology includes the following key components:

- Identify the significant issues associated with the proposed action and define the assessment
- Establish geographic scope for the analysis
- Establish future timeframe for analysis
- Identify other actions affecting the resources, ecosystems (including aquatic ecosystems) and human communities of concern
- Characterize resources identified in terms of their response to change and capacity to withstand stress
- Characterize the stresses affecting the resources and their relationship to regulatory thresholds
- Define a baseline condition for the resources
- Identify the important cause and effect relationships between human activities and resources
- Determine the magnitude and significance of cumulative effects
- Modify or add alternatives to mitigate significant cumulative effects
- Monitor the cumulative effects of the selected alternative and adapt management
- The analysis is supported by input/information from local officials, agencies, and community outreach activities.

5.3 Project Specific Methodology

The indirect and cumulative effects analysis will be conducted using the expert panel approach. This approach is one of the forecasting tools described in NCHRP Report 466 and has been used in many environmental impact studies in Wisconsin and nationwide.

Section 6: Environmental Justice Impact Methodology

6.1 Laws, Regulations and Guidelines

Environmental justice impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, 1994
- U.S. DOT Order on Environmental Justice, DOT Order 5610.2, 1997
- FHWA Order 6640.23, *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, 1998
- WisDOT FDM Chapter 21-15-1, *Format and Content of Environmental Documents* (includes Environmental Justice as one of the factors to be considered when evaluating resource impacts)

6.2 General Methodology

The proposed action and its alternatives are evaluated to determine whether there would be disproportionately high and adverse impacts on minority and low income populations with respect to human health and the environment. The analysis will be based on income and race information from the most recently available US Census. Additional information on race and income will be obtained from local agencies/organizations and through public involvement and community outreach activities. Potential impact categories include air, noise, or water pollution; increased vibration or traffic congestion; soil contamination; destruction of aesthetic value, disruption of community cohesion or economic vitality, disruption of cultural resources, changes in the availability of public and private facilities and services; adverse employment effects; and displacement of persons, businesses, farms, or nonprofit organizations.

6.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study. The environmental justice analysis will be based on income and race information from the **2010 U.S. Census and the Waukesha County Comprehensive Plan**. Additional information on race and income will be obtained from local agencies/organizations, and through public involvement and community outreach activities.

Section 7: Historic Resources Impact Methodology

7.1 Laws, Regulations and Guidelines

Historic resource impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- Section 106 of the *National Historic Preservation Act* as amended (16 USC 470)
- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT's Facilities Development Manual, Chapter 26, *Historical Preservation*

7.2 General Methodology

Impact evaluation includes identification of historic resources in the transportation project's area of potential effect by a qualified historian, evaluation of the resources to determine potential eligibility to the National Register of Historic Places, assessment of effects to determine whether an adverse effect will occur, consultation with parties indicating an interest in the historic resources, and implementation of agreements reached to account for unavoidable adverse impacts.

7.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 8: Archaeological Resources Impact Methodology

8.1 Laws, Regulations and Guidelines

Archaeological impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- Section 106 of the *National Historic Preservation Act* as amended (16 USC 470), FHWA's Technical Advisory 6640.8A
- FHWA 's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT's Facilities Development Manual, Chapter 26, *Historical Preservation*

8.2 General Methodology

Impact evaluation includes identification of archaeological resources in the transportation project's area of potential effect by qualified archaeologists, evaluation of the resources to determine potential eligibility to the National Register of Historic Places, assessment of effects to determine whether an adverse effect will occur, consultation with parties indicating an interest in the archaeological resources, and implementation of agreements reached to account for unavoidable adverse impacts.

8.3 Project Specific Methodology

No Additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 9: Section 4(f), 6(f) and Other Unique Lands Impact Methodology

9.1 Laws, Regulations and Guidelines

Public use land impacts (existing and planned public parks, recreation areas, wildlife and waterfowl refuges, other public-use lands and historic sites) for transportation projects are evaluated in accordance with the following key regulations and guidance:

- Section 4(f) of the U.S. DOT Act (23 USC 138; 49 USC 303)
- 23 CFR 774, FHWA's regulations for implementing Section 4(f) requirements for parks, recreation areas, wildlife and waterfowl refuges and historic sites.
- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- Section 6(f) of the *Land & Water Conservation Fund Act* as amended (16 USC 4601)
- *Federal Aid in Sport Fish Restoration Act* (Dingell-Johnson Act) as amended (16 USC 777)
- *Pittman-Robertson Wildlife Restoration Act* (16 USC 669)
- WisDOT's Facilities Development Manual, Chapters 20, 21, and 26
- Other public use land funding programs such as those administered by DNR

It should be noted that Section 4(f) of the U.S. DOT Act applies only to the actions of agencies within the U.S. Department of Transportation, including FHWA. While other agencies may have an interest in Section 4(f), FHWA is responsible for applicability determinations, evaluations, findings, and overall compliance.

9.2 General Methodology

The public use land impact evaluation includes an inventory of such resources in the transportation project's area of potential effect, a description of the resources including existing and planned use, funding sources, and jurisdictional agencies. The transportation improvements are located and designed to avoid or minimize impacts to public use land to the extent practicable. Where such resources cannot be avoided, impacts would be analyzed in terms of the amount of land required from the resource and any constructive use impacts such as increased traffic noise, changes in the visual setting, or other impacts that would adversely affect the intended use and enjoyment of the resource. WisDOT would coordinate with the jurisdictional agencies to obtain information on resource use, funding and management, and to obtain input on potential effects and possible mitigation measures.

9.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 10: Aesthetics Impact Methodology

10.1 Laws, Regulations and Guidelines

Aesthetic (visual) impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- FHWA's publication on *Visual Impact Assessment for Highway Projects* (DOT FHWA-HI-88-054)
- WisDOT's Facilities Development Manual, Chapter 27, Section 10, *Visual Impact Assessment*

10.2 General Methodology

The visual impact assessment includes identifying the visual character of the project corridor, characterizing the visual quality of the viewshed, identifying and quantifying viewer groups to the extent practicable (those with a view of the highway and those with a view from the highway), describing the visual change that will occur because of the proposed transportation improvements, qualitatively characterizing the change, and developing measures to mitigate adverse visual effects where a sensitive visual impact has been identified. Mitigation measures could include landscaping and aesthetic treatments on roadway components such as retaining wall, bridge abutments, and sidewalks.

10.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 11: Agricultural Impact Methodology

11.1 Laws, Regulations and Guidelines

Agricultural impacts for transportation projects are evaluated in accordance with the following key regulations and guidance:

- The *Farmland Protection Policy Act of 1981* (7 USC 4201-4209)
- FHWA's Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT's Facilities Development Manual, Chapter 24, Section 10, *Agricultural Lands*
- Chapter 32.035, Wisconsin Statutes (Agricultural Impact Statement)

11.2 General Methodology

To the extent practicable, the proposed transportation action and its alternatives are developed to minimize impacts on farmland and maximize compatibility with state and local farmland programs and policies. Agricultural impacts are quantified and reported to the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP). Based on the extent of the impacts, DATCP will determine whether an Agricultural Impact Statement is required. If needed, a Farmland Conversion Impact Rating form would also be prepared and coordinated with the USDA Natural Resource Conservation Service (NRCS).

11.3 Project-Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 12: Wetlands Impact Methodology

12.1 Laws, Regulations and Guidelines

Wetland impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- Section 404 of the *Clean Water Act* (33 USC 1251)
- Clean Water Act, 40 CFR Part 230, *Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material*
- Executive Order 11990, Protection of Wetlands (42 FR 26961)
- Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Part 332)
- DOT Executive Order 5660.1A, Preservation of the Nation's Wetlands
- *Fish and Wildlife Coordination Act* as amended (16 USC 661-667)
- FHWA policy and procedures for evaluation and mitigation of adverse environmental impacts to wetlands and natural habitat (23 CFR 777)
- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT FDM Chapter 24, Section 5, *Aquatic Systems*
- WisDOT *Wetland Mitigation Banking Technical Guideline* as amended, March 2002
- WisDOT/DNR Cooperative Agreement Amendment, *Compensatory Mitigation for Unavoidable Wetland Losses Resulting from State Transportation Activities*, 2001

12.2 General Methodology

Depending on the type of transportation improvements being proposed, the construction time period, and the extent of wetland resources in the project's area of potential effect, preliminary wetland boundaries are established using existing information such as the Wisconsin Wetland Inventory maps produced by the Wisconsin DNR, farmed wetland maps produced by the USDA Natural Resources Conservation Service, statewide, regional or local GIS data, and field inspection. If more precise wetland boundaries are required, more detailed wetland boundary determinations or delineations would be conducted in accordance with the interagency *Corps of Engineers Wetland Delineation Manual (1987 Manual)* and any subsequent guidance such as the Midwest Supplement for wetland delineations.

Transportation improvement alternatives are developed to reduce wetland impacts to the extent practicable through a sequence of avoiding wetlands where possible, minimizing impacts to wetlands that cannot be avoided and mitigating unavoidable wetland loss through various compensation measures as specified in WisDOT's Wetland Mitigation Banking Technical Guideline. Wetland compensation includes evaluation of on-/near-site replacement wetlands and use of an established wetland mitigation bank when on-/near-site replacement wetlands are not feasible or practicable. All unavoidable wetland loss would be fully compensated in terms of amount affected, type, and functional values.

Methodology for evaluation of on-site or near-site compensatory mitigation may include site suitability assessments early in the planning phase. This may include identification of existing wetlands in and adjacent to the potential compensation sites and any potential effects the mitigation project may have on those wetlands. These effects may be included in the impact analysis and be part of the site suitability assessment.

12.3 Project Specific Methodology

Wetland boundaries and function will be determined through existing information and field inspection in consultation with DNR and USACE. Field determination and/or delineation of wetlands on the Preferred Alternative will identify wetlands by type, acreage, associated waterway, and function.

Approximate wetland boundaries will be located during the non-growing season within a 400-foot wide corridor west of Pebble Creek from CTH X to 500 feet north of the Merrill Hills Road Bridge over Pebble Creek. North of Pebble Creek, preliminary wetland boundaries will be located within 100 feet of the centerline of the existing road.

February 2012 Update

Given the high quality of the Pebble Creek corridor wetlands, DNR requested a more in-depth wetland review/delineation which was conducted by SEWRPC (Dr. Donald Reed, Chief Biologist) in August – October, 2011. Information from SEWRPC's report is on the project website (waukeshbypass.org) and will be included in the EIS.

Section 13: Water Resources/Floodplains/Storm Water/Erosion Control Impact Methodology

13.1 Laws, Regulations and Guidelines

Water Resource and floodplain impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- Clean Water Act (33 USC 1251) including Section 303(d), impaired waters
- Executive Order 11988, Floodplain Management (42 FR 26951)
- DOT Executive Order 5650.2, Floodplain Management and Protection; Policies and Procedures (23 CFR 650)
- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT FDM Chapter 24, *Land and Water Resources Impacts* and FDM Chapter 10, *Erosion Control*
- Wisconsin Administrative Code Chapter NR 116, Wisconsin's Floodplain Management Program
- WisDOT/DNR Cooperative Agreement Amendment, *Memorandum of Understanding on Erosion Control and Storm Water Management*, 1994
- Wisconsin Administrative Code Chapter TRANS 401, *Construction Site Erosion Control and Storm Water Management Procedures for Department Actions*

13.2 General Methodology

Transportation improvement alternatives involving stream crossings and floodplains are developed to minimize impacts to water quality, floodplain values and stream hydraulics to the extent practicable through use of sound erosion control and storm water management practices, and by sizing new and replacement structures to minimize floodplain encroachment and increases in the height of the regional (100-year) floodplain elevation.

Impact evaluation includes assessment of existing conditions such as water quality, fishery resources, floodplain functions and values, potential adverse effects to these conditions, and proposed measures to minimize the adverse effects.

The extent to which erosion control and storm water management measures are proposed in the EIS depends on the type of transportation improvements being proposed, the construction time frame, and the extent of water and floodplain resources in the project's area of potential effect. A planning level project generally includes conceptual best management practices. Other projects may require more specific erosion control and storm water management commitments.

13.3 Project Specific Methodology

Evaluation of floodplain and water resource impacts for the West Waukesha Bypass Study will include the following:

- Evaluate historical aerial photographs for changes in hydrology and possible tile locations;
- install data logging well points at select locations;
- Evaluate soils at well points and other possible locations;
- Measure stream flows at select locations;
- Measure water quality parameters such as temperature, dissolved oxygen, conductivity, and pH at stream gauge locations;
- Evaluate topography, soils, wetlands and drainage features for mitigation opportunities.

Section 14: Groundwater, Wells, and Springs Impact Methodology

14.1 Laws, Regulations and Guidelines

Water Resource and floodplain impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- Clean Water Act (33 USC 1251)
- Safe Drinking Water Act (42 USC 300(f)), Section 11424(e), sole source aquifers
- WisDOT FDM Chapter 24, Land and Water Resources Impacts
- Wisconsin Administrative Code Chapter NR 140, Groundwater Quality
- Wisconsin Administrative Code Chapter NR 809, Safe Drinking Water
- Wisconsin Statute Chapter 160, Groundwater Protection Standards
- Wisconsin Act 310, Groundwater Quantity Law
- Wisconsin Administrative Code Chapter TRANS 401, Construction Site Erosion Control and Storm Water Management Procedures for Department Actions

14.2 General Methodology

Groundwater sustains lake levels and provides the base flows of streams and comprises a major source of water supply for domestic, municipal and industrial users. Transportation improvement alternatives are developed to minimize impacts to groundwater, wells, and springs to the extent practicable.

Major aquifers in the study area will be identified and the quality of groundwater will be assessed. Water supply sources in the study area will also be identified. The location of wells in the study area will be identified.

In order to determine the impact to groundwater and surface water, a series of historical aerial photographs will be evaluated for changes in hydrology and possible tile locations, soils will be evaluated, stream flows will be measured, and stream temperature, dissolved oxygen, conductivity, and pH will be measured at the locations where the stream flow is gauged. The distribution of topography, soils, wetlands, and drainage features will be evaluated for mitigation opportunities.

14.3 Project Specific Methodology

A series of monitoring shallow wells will be used to evaluate the groundwater condition. A report for the groundwater and surface water assessment will be prepared after data is collected.

February 2012 Update

Based on input from SEWRPC and other agencies at the July 25, 2011 inter-agency meeting, groundwater movement was identified as a possible environmental impact factor, particularly for the Pebble Creek West Alternative that would traverse areas where groundwater seeps have been identified. Therefore, additional groundwater investigations were conducted by the project team in December 2011 and January, 2012. Information from these investigations will be placed on the project website and included in the EIS.

Section 15: Upland Habitat Impact Methodology

15.1 Laws, Regulations and Guidelines

Upland habitat/wildlife impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- *Fish and Wildlife Coordination Act* as amended (16 USC 661-667)
- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT FDM Chapter 24, *Land and Water Resource Impacts*
- FHWA *Guidelines for Consideration of Highway Project Impacts on Fish and Wildlife Resources*, 1989

15.2 General Methodology

Upland habitat includes non-wetland areas in the project's area of potential effect that have vegetative cover suitable for supporting wildlife. Such areas include woodlands/shrub thickets, fallow fields, fence lines, and remnant prairies dominated by grasses and forbs. WisDOT coordinates with DNR, other agencies, and regional planning commissions as appropriate to obtain information on the quality and classification of wildlife habitat in the project's area of potential effect.

Impact evaluation includes an assessment of existing conditions (community type, connectivity to other resources, wildlife associations), amount and type of habitat affected by the proposed project, fragmentation or severance of ecosystems, and possible effects on wildlife permanently inhabiting or passing through the upland habitat areas. At this time, FHWA does not have a policy for mitigating upland habitat impacts. It is FHWA's position that normal practices such as providing appropriate management of land within the highway right-of-way, using location, design and construction techniques to minimize habitat impacts, and possible acquisition of wider rights-of-way will adequately mitigate the loss of upland wildlife habitat.

15.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 16: Threatened and Endangered Impact Methodology

16.1 Laws, Regulations and Guidelines

Threatened and endangered species impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- *Endangered Species Act* of 1973 (7 USC 136; 16 USC 1531)
- *Migratory Bird Treaty Act* (16 USC 661)
- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- FHWA guidance memo, *Management of the Endangered Species Act Environmental Analysis and Consultation Process*, 2002
- Wisconsin Administrative Code Chapter NR 27, *Endangered and Threatened Species*, 2005
- WisDOT/DNR Cooperative Agreement Amendment, *Memorandum of Understanding on Endangered and Threatened Species Consultation*, 1998
- WisDOT FDM Chapter 24, *Land and Water Resources*

16.2 General Methodology

The impact evaluation for threatened and endangered species includes a determination of the presence or absence of any federally listed or state listed threatened or endangered species or their critical habitat in the project's area of effect. The presence or absence determination is made in consultation with DNR and the U.S. Fish and Wildlife Service and may include field inventories by qualified resource biologists.

If federally threatened or endangered species or their critical habitat is present and cannot be avoided by location and design refinements to the proposed transportation project, WisDOT and FHWA would proceed with consultation steps under Section 7 of the Endangered Species Act.

For state listed species, WisDOT would develop a conservation plan or lay the groundwork for an incidental take permit in consultation with DNR.

WisDOT will also incorporate construction contract special provisions if needed to eliminate or reduce impacts.

16.3 Project Specific Methodology

Tier 3 habitat for the Butler's gartersnake, a state-listed threatened species, is present in the West Waukesha Bypass study area. Tier 3 habitat sites potentially support large Butler's gartersnake populations and are critical to the long term conservation of this species. The EIS will identify alternatives that could potentially affect Tier 3 habitat sites and will include a discussion of conservation strategies for avoiding and/or minimizing potential impacts to these sites.

February 2012 Update

Review and comparison of the alternatives in terms of their potential impacts on habitat for the Butler's gartersnake and Blanding's turtle (state-listed threatened species), was done in December 2011 by Great Lakes Ecological Services, LLC (Dr. Gary Casper). Information from this additional investigation will be placed on the project website and included in the EIS.

Section 17: Air Quality Impact Methodology

17.1 Laws, Regulations and Guidelines

Air Quality impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- *Clean Air Act* as amended (42 USC 7401)
- *Determining Conformity of Federal Actions to State or Federal Implementation Plans* (40 CFR, Part 93), EPA
- *Transportation Conformity Guidance for Qualitative hot-spot Analyses in PM_{2.5} and PM₁₀ Non-attainment and Maintenance Areas*, March 2006, EPA and FHWA.
- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- FHWA air quality conformance guidance (23 CFR 450)
- FHWA *Interim Guidance on Air Toxics Analysis in NEPA Documents*, 2006 and as updated in September, 2009
- Wisconsin State Implementation Plan
- Wisconsin Administrative Code Chapter NR 411, *Construction and Operation Permits for Indirect Sources*

17.2 General Methodology

The Environmental Protection Agency (EPA) has set national air quality standards for six principal air pollutants (also referred to as criteria pollutants): carbon monoxide (CO), lead, nitrogen dioxide (NO₂), ozone, particulate matter and sulfur dioxide. Transportation contributes to CO, NO₂, ozone and particulate matter. Air quality impacts for transportation projects are evaluated in view of these criteria pollutants using established air quality assessment techniques.

17.3 Project Specific Methodology

Waukesha County is designated as **being in moderate non-attainment for the 8-hour ozone standard**, and non-attainment for particulate matter (PM_{2.5}). The project is included in a conforming regional transportation plan, so no ozone analysis is required.

Projects in PM_{2.5} non-attainment areas require a qualitative hot-spot analysis if they are “projects of air quality concern” as defined in 40 CFR 93.123(b)(1). A hot-spot analysis is an estimation of future localized PM_{2.5} pollutant concentrations and a comparison of those concentrations to air quality standards. Transportation projects of air quality concern are those that would have a significant volume of diesel truck traffic or that would have intersection traffic operations at Level of Service (LOS) D or worse. Per FHWA and EPA transportation conformity guidance for qualitative hot-spot analyses, highways with greater than 125,000 annual average daily traffic (AADT) and 8% or more diesel truck traffic would be of air quality concern. The highest forecast traffic volume for the West Waukesha Bypass is 30,000 AADT (design year 2035) and it is anticipated that intersection traffic operations will be at LOS C or better. Therefore, a PM_{2.5} hot-spot analysis is not anticipated to be required at this time.

A qualitative analysis of mobile source air toxics (MSAT) will be prepared. The analysis will be based on FHWA's February 2006 and September 2008 MSAT guidance.

Section 18: Traffic Noise Impact Methodology

18.1 Laws, Regulations and Guidelines

Highway noise impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- FHWA Federal Aid Policy Guide, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772)
- Wisconsin Administrative Code Chapter TRANS 405, *Siting Noise Barriers*

18.2 General Methodology

Transportation projects are evaluated for traffic noise impacts and abatement measures to help protect the public health and welfare, to provide noise abatement criteria, and to provide information to local officials for land use planning near highways. The noise analysis also provides information on noise generated from typical construction equipment during the construction period.

Existing and design year traffic noise levels are modeled at residential, commercial, and other sensitive receptors along the project corridor using FHWA's Traffic Noise Prediction Model (TNM)[®] 2.5 computer program. The TNM includes traffic characteristics that yield the greatest hourly traffic noise on a regular basis for existing conditions and the future design year. Under TRANS 405, noise impacts will be evaluated further to determine the reasonableness and feasibility of potential mitigation measures such as noise walls. If noise mitigation is reasonable under TRANS 405 criteria, additional public involvement related to noise mitigation would be initiated.

18.3 Project Specific Methodology

Existing noise levels for alternatives that involve new alignments will be determined through field measurements using a sound level meter.

Section 19: Contaminated Sites Impact Methodology

19.1 Laws, Regulations and Guidelines

The impacts of potential environmental contaminants are evaluated in accordance with the following key laws, regulations or guidelines:

- *Resource Conservation and Recovery Act of 1976 as amended (42 USC 6901)*
- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- WisDOT FDM, Chapter 21, Section 35, *Contaminated Site Assessments and Remediation*

19.3 General Methodology

The Phase 1 investigation for potentially contaminated sites uses field observations, interviews and records searches to identify sites that have a high likelihood for contamination. Phase 1 screening is performed for all alternatives carried forward in the environmental document. A Phase 2 investigation which includes subsurface testing, is performed on sites located within the area of effect for the preferred alternative. Further investigation is performed when necessary after a preferred alternative is selected. WisDOT also evaluates existing highway structures that need to be replaced or rehabilitated as part of a proposed transportation improvement to determine whether any asbestos materials or lead paint were used in the construction, renovation or rehabilitation of the structures.

19.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

Section 20: Construction Impact Methodology

20.1 Laws, Regulations and Guidelines

Construction impacts are evaluated in accordance with the following key laws, regulations or guidelines:

- FHWA Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, 1987
- FHWA *Work Zone Safety and Mobility Rule* (69 FR 54562), 2004

20.2 General Methodology

Discussion of construction related impacts may include access to facilities and services, emergency response, air quality (emissions and fugitive dust), noise, water quality (erosion and sedimentation), construction solid waste/hazardous waste, and vibration as applicable.

Additional construction related information will include the following:

- General discussion on transportation management plans (TMPs) for reducing traffic and mobility impacts, improving safety, and promoting coordination within and around the work zone.
- Conceptual discussion concerning the possible availability of construction material sources (borrow sites) in the area of the proposed project.
- Conceptual discussion concerning utility relocations and possible new locations for such facilities as applicable.

20.3 Project Specific Methodology

No additional project specific methodology has been identified for the West Waukesha Bypass Study.

